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National Standards Institute (ANSI) says so. The fact
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is all Elephont[™] floppies meet or exceed the specs required to meet or exceed all their standords. But just who is "subcommittee X388" to issue such

pronouncements? They're or group of people representing o large, well-balanced cross section of disciplines—from accodemio, government agencies, on the computer industry. People from places like BM, Hewleth-Packard, 3M, Lowerne Libumore Lab, The US. Department of Defense, Honeywell and The Association of Computer Programmers and Analysts. In short, if so bunch of high-caliber nitripicken whase mission, it seems, in order to make better dasks for consumers, is day to order to make better dasks for consumers, is day to

make life miserable for everyone in the disk-making

bourness. How's By gathering together periodically (often, one suspects, under the full moon) to concoct more and more rules to increase the quality of flexible disks. Their most recent rule book runs over 20 singlespoced pages—fising, and instaling upon—hundreds upon hundreds of standards o disk must meet in order to be blessed by ANSL (And thereby be tolen seriously by people who take disks seriously). In fact, if you'd like o copy of this formidable doulin fact, if you'd like o copy of this formidable dou-

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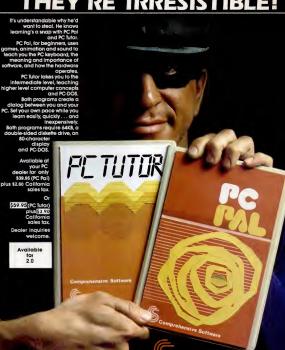
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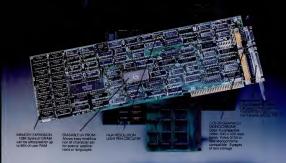
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Cliff Wilton, President The Computer Store 855 Front Street San Francisco, CA 94111

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Sincerely, Greg Karraker Sales Manager

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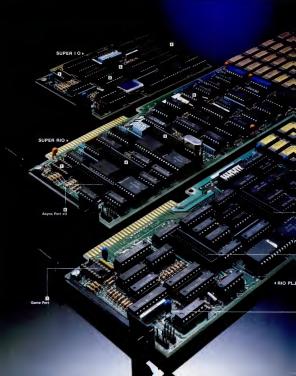
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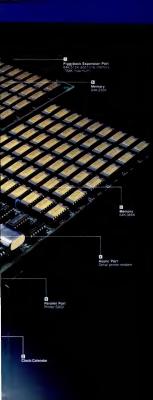
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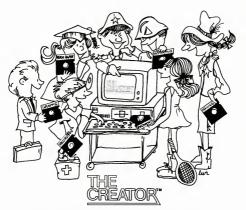
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FROM THE EDITOR'S SCREEN/COREY SANDLER

To find the real meaning behind the prose in hardware and software manuals you have to read between the lines.

Documenting An Infinite Number Of Monkeys

HELP WANTED:
Semilarealo, nocreative mesemilarealo, nocreative mesemilarealo, nocreative mesemilarealo, nocreative medifficulto media del controlo
solidarea roma a plus Wood processing alemante roma a pl

Perhaps you haven't come across this ad, but you've surely encountered the end product. To adapt that most overused and unpleasant phrase, we are all too often victims of non-user-friendly "documentation." I think its authors are wrong from the very start: We would eutomatically be on friendlier territory if they'd start calling the things "manulas."

Writing a manual for a complex piece of work. like word processor or telecommunications program is considerably different from writing poetry, but there is still a fundamental need to communicate with the reader. Many of us who use microcomputers out of necessity have resorted to learning programs by experimentation; lust open the box, pop the disk in the drive, and explore. When oil else foils, read the monuol.

So how do these manuals get written? They sometimes make me think of Bob Newhart's classic comedy routine in which a scientist explains the theory of probability. It went something like this: if you put en infinite number of monkeys in front of an infinite number of typewriters.



end let them peck away for an infinite period of time, sooner or later one of them will produce a great masterpiece of litera-

"Eureka!" yells the scientist as she grabs a sheet of paper from one of the simian typists. "Listen to this! To be, or not to be; that is the gzornnplatt.'"

I thought I might offer a few translations of some of the most egregious paragraphs from menuals written for—or at the PC user. All of the examples are real; only the names have been changed to protect the guilty.

FROM A MODEM MANUAL: The user hos the ultimote responsibility to correct problems arising from hormful rodio-frequency emissions for equipment under his control. If this equipment does cause to interference to rodio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference or these responsibilities and ony others not mentioned ore exclusively of the exception of the user is considered to the control of the control of the user is the control of the user is the user is the user is the user to the exception of the user.

TRANSLATION: Don't coll us if your VisiCalc screen morches ocross your neighbor's Sony in the middle of the World Series. Thot's between you ond the FCC. Fix it yourself.

FROM A DISK COPYING UTILITY:



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Card replaces IBM's monochrome card giving you text compatibility or two pages of graphics, each with a resolution of 720h × 348v. You'll get the monochrome's high quality character set. software compatibility with programs like VisiCalc," WordStar* and dBase II." and a printer interface for

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any parallel port printer. eaphics Card Herroles remeatable software from other venders includes programs for bump graphics, CAD, and word processing with of the dealer nearest you.

Hercules Graphics Card and Graph X are trademarks of Hercules Computer Technelogy 1-2-3 is a trademark of Letus

trademark of VasiCorp W

Most computer software that is ovoilable from the IBM Personol Computer is copyrighted, trodemorked, and protected under the lows of the United States of America. There are numerous morol and finoncial issues which you should be owore of when using the . . . utility. . . .

TRANSLATION: Our lowvers mode us run this.

UST OPEN the box, pop the disk in the drive, and explore. When all else fails, read the manual

FROM AN EXPENSIVE DATABASE PACKAGE: After our new manual went to print we found some typographical errors and we revised o few ... commonds. Enclosed ore the corrected pages. Please insert them into this manual occording to this substitution chart. Discard the old

TRANSLATION: We didn't get ground to proofreading the manual until we shipped the first 18,000 copies, so we received o couple hundred phone calls from users who said the program didn't work. We don't want to be bothered with inserting these new pages or reprinting the whole manual-whot do you expect from o \$495 product?

FROM A "SIMPLE" DESKTOP MAN-AGER: String overflow-Seg XXXXXXXX P pp 9 oo indicotes o system foilure which is usually the result of hordware error. It can olso be caused by a damaged databose. If this error occurs you should record the name following "Seg," and the numbers which oppear os pp and oo. You should then follow the procedures in section 20.2 and 20.1. If the problem con be reproduced with o new copy of . . . then you should communicate with technical

TRANSLATION: Hoo boy, do you hove o problem! We sure hope it's in your computer and not our program. Check it out, will you? And thanks for beta-testing our product.

FROM A UTILITY PACKAGE: Print Spooler Module Update: If you try and run the spooler without hoving first created the Autoexec.Bot, the system will lock up and you must re-boot.

TRANSLATION: We call this an updote so that you won't recognize that we mode an horrendous mistake. And please tape this little slip of paper somewhere in the manual, would you? We couldn't be bothered to do it ourselves.

FROM A FAMOUS WORD PROCES-SOR: *** FATAL ERROR F29: RENAME FAILURE, SYSTEM FAILURE, OR YOU CHANGED DISKS. These messages should not occur.

TRANSLATION: Go gwoy son, you bother me

Newhart, you were wrong. An Infinite number of monkeys sitting at an infinite number of microcomputer keyboards couldn't write a great computer manualmerely the typical ones. Gzornnolatt!

In Search of Literacy

This issue is devoted to shedding some light on the somewhat dreamy state of training and education available to the PC user. PC's authors went back to school. studied the books, watched instant replays on videotape, and put a few manuals through a literacy test. The computer virgin continues his expedition into PC-land, opening the cartons, installing his computer, and using it as a word processor.

> N INFINITE number of monkeus sooner or later will produce a great masterviece of literature.

Moving on to some literature of recognized merit. I am proud that these pages include an interview with Pulitzer Prize winning playwright Marsha Norman, an IBM PC fan Is that the school bell I hear, or has your

/PC printer run out of paper again?

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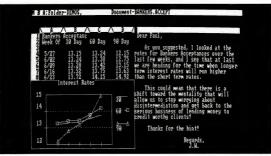
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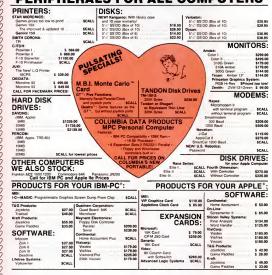
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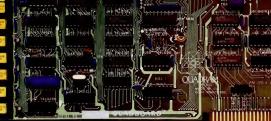
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Letters To PC

Hooray for the R, G, and B I enjoyed the article on RGB monitors, (High Resolution Color Monitors," PC.

Volume 2 Number 1), but have two ouibbles, one minor and one major. First, NTSC is usually rendered es

"never twice the same color." Winn Rosch left out the word "twice." Second and more important, the article's sidebar names red, green, and blue as the three primary colors of light. As I recall from my kindergarten peint experiments, vellow is a primary color of light; green, through the megic of technology, is a primary color of video, and video only.

Keen up the good work. The magazina continues to improve and the artwork is a pleasure.

Robert G. Saltar New York, New York

Winn Rosch renlies: NTSC stonds for either "never twice the

same color" or "never the same color." Both are correct. The red, yellow, and blue paints you

remember from kindergorten were pigments. The primory colors of light ore different; red, green, and blue.

In his articla "High Resolution Color Monitors," Winn Rosch calculates tha shedow mask pitch (dot pitch) for the IBM color monitor to be lass than .375 mm. Yet the accompanying chart shows it to be .43 mm. Wherein lies the error? Bill Kraengel, Jr. Vallay Stream, Naw York

Winn Rosch replies:

The dot pitch figure I colculoted in the article was the largest pitch that would allow the disploy of a harizontal line of 640 separate dats on a 12-inch diagonal monitor. The chort reveals that several supposedly high-resolution monitors cannot resolve the quality that they claim to. In truth, although the IBM color monitor (and several others) can address o screen imoge with o resolution of 640 x 200 dots, it cannot displey an imoge with resolution that high. The result is not the inobility to disploy o row of 80 characters ocross the screen, but the inobility to disploy the individual dats of those characters and therefore a lock of shorpness of the screen image-which mov or mov not be occeptable to you. Only you can be the judge of that.



Help for the Confused I think I can halp others who, like me, are shopping for a parsonal computer. I have discovered what the phrase "IBM

compatible" meens. Apparently, IBM compatible refers to anything from "Wa are currently being sued by IBM for patant infringement" to "If you look carefully, you will detect a

feint resemblance between this machina and the IBM PC. Glad to be of halp.

Thomas I. Roberts Storrs, Connecticut

Sexism Doesn't Sell

I look forward to each issue of PC Mogozine. I heve found the magazine vary informative and quite interesting

In Volume 2 Number 1, though, the art accompanying the article entitled 'The TRS-80 Model 100: Never An Idla Momant" was appalling. The pictures on pages 194 and 195 portray women as sex objects. On page 194, men in business suits are staring et a woman in a miniskirt. On pege 195, the seme woman has an incredibly stupid, little-girl look on her face, apparently amazed at how smart the hot dog vandor is with his TRS-80. It's 1983 and times have

changed! Sexism won't sell magazinas or TRS-80s to a woman in the computer industry (or any other industry, for that mat-

> Adrienne Florence Waston, Massachussatts

We meant no offense in our search for yet onother woy to toke on interesting picture of o piece of metol, gloss ond silicon. Yours was the only letter we received about the illustration -Ed

Comments on Computer Art

Meny thenks for the fine job you did on my work and on the Douet Permutations program ("Computer Art for Art's Sake." PC. Volume 1 Number 12).

I only have one small quibble, namely that I did not rediscover Douat's work myself. Professor E.H. Gombrich acknowledges in his book The Sense Of Order that Stuart Durant is the discoverer of the Douat work.

Mark Wilson

Cornwall, Connecticut

As one who has an article in press on Mandelbrot's frectel geometry (to appear in the Two-Year College Mothemotics Journol, Methematical Association of America), I was pleased to read Mark Wilson's ecknowledgement of Benoit Mandalbrot's contribution to computer art. There are, however, two corrections which need to be made.

In the first place. I am certain that author Lindsy Van Gelder meant to sev that Mandelbrot's fractal elgorithms (not logarithms) were used to create special

Letters To PC

effects for Stor Trek II: The Wroth of Khon. In the second plece, even this corrected statement is not, strictly speaking, quite right.

The "fractal" sequence in The Wroth of Khon was generated by a technique dayaloped by Loren Carpentar of Lucasfilm Ltd. in San Rafael, California. I place quotes around the word "frectel" because Mendelbrot is rather critical of Carpentar's approach, pointing out that the resolution attainable by the Carpentar algorithm is intrinsically limited. This limitation, says Mendalbrot, does not apply to his own algorithms. In all fairness to Carpenter, it should be pointed out that limited resolution is one of the trade-offs he made in attempting to devise a prectical scheme for the generation of computer imeges. Carpenter notes that the typical frametime for the simulated mountain scenes evereged an hour

and o holf of computer time.
Those who are interested in Mandalbrot's work should consult his book, The Froctol Geometry of Noture (W.H. Freeman and Company, 1982), which is both an intellectual and visuel treet.

> Anthony Barcellos Devis, California

Lindsy Van Gelder replies: Borcellos is correct. I meont to soy olgorithms, and f regret the error.

Communications Breakdown

I wes surprised to read in PC-Communiqués (PC, Volume 1 Number 5) the blankat statament thet the software distribuied by the New York Ameteur Computer Club (NYACC) runs only on mechines equipped with en 8080 board. While it is true thet some of the eerlier disks reouire this support, these disks make up

just e fraction of the disks in our library.

As the communiqué in question
points out, many of the earlier disks can
be modified to run under PC-DOS. The
library now includes 33 disks and is
growing fast. Seventeen of the disks #1
and #18-331 run under PC-DOS with no

modification. We are in the process of converting disks 2 through 6 end will be re-releasing them.

We beliave in the widest possible dissemination of public domein softwere, end we appreciate your help in publicizing our program.

Doneld C. Wiss

Doneld C. Wiss Secretary, NYACC New York, New York

Slash Those Zeroes

I wes reading "Exercising ASCII" by John Schnell (PC, Volume 1 Number 12) end I noticed that in the progrems listed, it wes impossible to distinguish the lettar O from the number 0. I found it very difficult to use the program because I hed to stop programming every time there was en O or 0 to Equip out which

wes indicated.

I suggest thet if you continue to print progrem listings, you should find e way to differentiate between the two symbols. It is common practice to displey the number zero with e slesh through it when writing e progrem.

Robert H. Garretson III Huntington Beach, California Beliave it or not. it's not easy to find o

typefoce with slashed zeros. Of course, we could hond-letter each copy, but....

—Ed.

Plus and Minus

Last year I bought Home Accountant Plus, e financial pleaning end record keeping progrem for my 64K RAM IBM PC. After many hours of girld satting up diffarent budget configurations end geting inexplicable arror messegs, I took the program to the ComputerLand store where I bought it. They got the same results.

After much experimentation and sev-

call hone calls to the menufecturer, Continentel Software, it was revealed that some copies of en earlier version of the program, for use with 128K, hed been eccidently released with instructions for 64K. I returned my disk to Continentel for appropriete modifica-

to Continental for appropriate modification. The program words with 64K, below the program words with 64K, below the program of the program

Initially, I thought this program was well set up, end could really help with my feirly complicated household eccounting. So far, however, virtually evarything I heve tried to do with it could have been done fester menually.

D. Dougles Peel Newton Squere, Pennsylvania

Curvfit Shapes Up

Thank you for publishing Winn Rosch's review of Currift-3D ("The Slightly Twisted Plot of Currift-3D." PC, Volume 1 Number 12). Many improvements heve been mede to the program over the version (1.0) that Rosch reviewed.

It is our policy to immedietely eddress all reported bussend send along en new copy of the corrected program et no charge. All bugs reported by Rosch in his review been corrected. Curryli-3D's error-trapping facility has been enhanced es well, thus removing the likelibood of generating e fetal error during execution.

While the current reteil price for Curyfit-3D is \$125, respondents to the article in PC can acquire it for the old price of \$90. All users of our softwere are encouraged to call to discuss problems or offer criticism.

Merk A. Herkommer Petrospec Richardson, Texes





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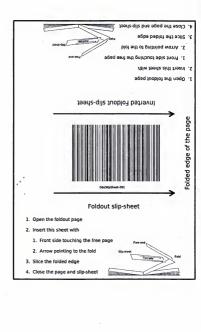
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Letters To PC

Look Out, WordStar

Your megazine is getting bettar by leaps and bounds with each issue. I read with particular interest two articles in Volume 2 Number 1. One was Corey Sandler's report on the reader survey, "Getting To Know You." The second was Stephen Manes's review of the revisad WordStor, "WordStar 3.24 and 3.3; MicroPro Does It Again . . . And Again."

I feel very fortunate that I never purchesad WordStor, from what I hear about it. Menes's article wes followed by an article on how to fix up a had goof, "Fast Recovery From WordStar Disaster " It is difficult to understand how anyone can like a piece of software with so many problems.

The word processing software I use. Eosy Writer II and Eosy Speller, costs less then WordStar, SpellStar, and Moil-Merge. As far as I can tell. EosyWriter II and EosySpeller do eil that WordStor does end probably more. There are still a

few minor things IUS might do to improve Easy Writer, but as I read Manes' article I began to fael more and more fortunata.

> Clifton E.R. Lawson Oregon, Wisconsin

On many occasions I have reed comments sent in to PC about word processing programs such as WordStor, Volkswriter, Versotext, and EosyWriter I and II. I would like to present my views on a new word processing program that has not been given much attention.

I am a computer novice end had been looking for e word processing program since I purchased my computer. My first stap was to scan the eds in PC to find word processing programs that I could try out. I tried several, but the most userfriendly of ell was Wordvision by Jim Edlin.

The program is not complete; I received what is called a pioneer's version. If, as the publisher admits, the existing program contains just a small sample of

what the finished product will contain. then WordStor beware!

Gary B. Kandrick Chattanooge, Tennessea

Don't Trade On Safety

In his erticle, "Trading Secrets" (PC, Volume 1 Number 10), Daniel Remar recommends following advice contained in Iemes Pooley's Trade Secrets in order to stay out of trouble.

Howaver, "requiring vandors to ship raw materials or chemicals in plain, coded containers with no indication of contents or suppliers" might protect secrets but eliminates protection of the individuals who may come into contact with these substances during shipment and

handling. What if Remer's hypothetical entrepreneurs, Johnson and Atkins, take Pooley's advice? Assume thay set up shop in one of the increasing number of states and/or local municipalities with "worker right to know" laws on the books. This is a likely scenario, since one of these laws exists in Celifornia as the newly enacted "Hazardous Substances Information and Training Act." Assume. then, that the two locate the business in the heart of Californie's Silicon Velley, thus elso coming under the jurisdiction of Santa Clara County's "Model Ordi-

A truck containing substances amply protected by plain brown wrappers and codes backs up to the loading dock of the Johnson/Atkins fecility. As one of their forklift trucks manauvers the load. the operator turns too sharply. The unmarked containers spill off the truck, hit the concrete loading dock, and break open. What happens next? The codes heve been ohliterated by the spilled substances. Who is the supplier? Who is the manufacturer? What is the stuff? What can it do to people and materials in the short run or over time? How does it interact with water, solvents, or other cleanup materials?

If the forklift operator mops up the mess and finds his skin covered with severe chemical burns in a matter of hours. Johnson/Atkins has little "protection" from a nasty suit for failure to provide information regarding the hazards, controls, and emergency measures associeted with a hazardous substance. As the IRS oftan quotas, "Ignorance of the lew is no defense!"

The consequences for a small company lika Johnson/Atkins can be financially devastating. Consider the bankruptcy proceedings of large, healthy Manville corporation based on projected future settlements from suits for "withholding" information regarding hazards of asbestos. Or keep in mind the recent eward of just under \$5 million to plaintiffs who convinced the Californie jury that the defandant company had not informed them of possible sterility and infertility associated with use of the chemical

Bafore taking Remer or Pooley's advice, remember the consequences of feilure to comply with the law.

Muriel Akamatsu, Ed.D Progrem Management in Occupational Heelth and Safety Oaklend, California

Danial Ramer replias:

I think Muriel Akomotsu raises on interesting and valuoble point. Clearly no one should put others' health and sofety in jeopardy in the interest of protecting trode secrets. I agree that compliance with the low and common sense should toke precedence.

Friendlier Finances

The two articles about personal and home finance programs for the IBM PC ("Personal Finance Programs For The Personal Computer" and "Five Financial. Programs For The Home," PC, Volume 1 Number 10) failed to mention what I consider the friendliest and fastest personal financial program, Personal FiPREMIERING IN SAN FRANCISCO AT THE IBM PC FAIRE.

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I have also indicate through on the modelinearms per requeste regarding the fixed plant and the experience scattering to the sizes. It was a fairly employ process to make the changes ofth our Strange make and I think you will be quite planted with the specific or.



This building design provides a special reprint with an architecturity pleasing energies examples. It will except furtill your meets to efficient use of specs and alto debrity of construction without consciousing structured green and benefit. The 'Design image I developed this strength of configuration of the part this out.



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Letters To PC

nonce Moster by Spectrum Software. Personol Finonce Moster sells for only \$75 and easily outdistances most of the programs reviewed in the two articles when it comes to speed and simplicity, while retaining all the features of the other programs. In addition, it keeps track of addresses ood prints them on checks sutomatically. This is a real timesaver when I am paying the monthly

Editing transactions is fast end easy, and there is no fester progrem for recociling a bank statement. A real boous is that what you see on the screen or on a printout looks like a real checkbook.

As far es I am concerned, you missed one of the best programs available for home accounting.

g. Charles A. Coakwell, III Meyfield Heights, Ohio

Sex and the Single Computer f would like to take partial exception to the findings of the Nationel Institute of Occupational Safety and Health (PC-

Communiqués, Volume 1 Number 12).
Your IBM PC probably won't meke
you sterile, but it surely cuts down the
time available for sex. f guess the result

Wm. B. Sweet Rio de Ianeiro, Brazil

A Company That Cares

isn't all that different

Much has beeo written about hordwere and software support, and I would like to add a few words about my experiences. About 6 months ago I purchased an ABM Omal Board with a serial port, clock, printer port, and game adopter for my IBM PC. The game edopter was advertised as capable of working with up to two Annie lovaticks.

Receotly, I finally bought one Applecompatible joystick and hoped to play some games on my PC. Much to my dismay, the joystick buttons didn't work properly with the software I had purchased. After only one phone call and one letter, ABM fixed the bug by seeding me a terminator plug for the phantom second joystick.

The company understood the problem and solved it duckly, at no cost to

me. I want to recommend ABM's products and support to your readers. Service and support are not e matter of local dealers or mail order houses, but of findling good people, with expertise, who care enough to help.

Keo Topolinski

Arlingtoo Heights, Illinois

Drowning in Books Book excerpts are fine, but there is a real

need for a regular book review section or column in PC. At last count, our local computer bookstore bad 17 volumes devoted to the IBM PC, with, the store cleimed, "st least snother dozen titles on their way!"

Singly or in batches, review 'em all!

J.A. Du Lac

San Francisco. Californie

RPG II, Where Are You?

I have been searching for informetion on the possible development of an RPG II compiler for the FC. I have read count-less computer journals, including Volume 1 Numbers 3 through 12 of FC. Mogrozine, and have found only one being definemention of such an animal. Why the lack of information? Is there some reason the language I have been using on IBM. System 3s, 23s, and 34s for the past 8 years does not lend itself to the IBM PC.

Rick Manning.

Rick Manning Pine Bluff, Arkansas

There is no reason we know of why RPG if to general purpose programming and reporting longuage that works on the basis of setting switches) should not be operable on the PC. We have seen RPG if on a CP/M machine, but not yet on our fovorite computer. Anyone out there with the inside scoop?—EA.



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Letters

In Defense of Paradise

I am very disappointed in the editorial policies of FC Mograine that permit the publication of an article containing a sentence such set the one in Paul Somerson's "Disling for Dullards." (Yolume 2 Number 1, page 438) To whit: "Interesting philosophy here: present one and only one feet to the user set time, as if comprehending more were out of the question. You can tell without looking set the label that this was made in California."

If others in Californie feel as I do, you might consider publishing an apology and emending your editorial policies to avoid further such affronts.

Lawrence A. Harvey San Diego, California

Poul Somerson wonted to reply to your objection, but we were ofroid he would offered jersey or Texus or... "Tou were not the only one who took issue with the pussage in question. Several IT editors pussage in question. Several IT editors on the pussage in question. Several IT editors on the pussage in the pussage while the pussage in the pussage while the pussage in the pussage while the no ovoil. You know how unreasonable those New Yorkers can be.—Ed

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gram, utility, etc. appears in one of your articles, may we copy it for the ebove purpose, provided we steet the author and source? What are the rules and limitations?

Mark C. Ginter.

Secretary, ACORN: Greater Cincinnati IBM PC User's Group Cincinnati, Ohio

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Corrections

The captions for the photos of the Hewlett-Peckard 740A Plotter and the Houston Instruments HiPlot DMP-40 ("Two Computerized Dreftsmen," PC, Volume 2 Number 1) were inadvertently reversed. The Houston Instruments plotter appears on pege 289, and the Hewlett-Peckard plotter on page 288.

400 VA model, manufactured by Topaz Inc. (New On The Market, page 596, PC, Volume 2 Number 1), is \$695.

The figure appearing on pege 420, Volume 2 Number 1, is part of the article "A Fast Recovery From WordStar Disas-

How to Write to PC

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All material submitted is subject to editing.

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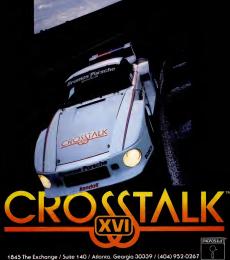
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A compendium of facts, news, opinions, gossip, inside intelligence, forecasts about IBM Personal Computers.

The GSA's D.C. PC PX

The federal government's General Services Administration (GSA) is eesring up to open a chein of stores that will sell microcomputers to federal agencies et a significant discount. The GSA has asked several computer vendors to hid on operating a pilot store in Washington, D.C.; the bidders must be able to provide training and be ready to expand

nationwide on 90 days' notice. The GSA will sweeten the deal by providing the winning vendor with a rent-free location and a guarantee that if federal agencies spend less than \$100,000 in the store each year, Uncle Sugar will dig deep down into our pockets to make up the

Irate independent computer vendors are not taking this lying down. The National Association of Computer Stores (NACS) protested to the GSA, stating that "existing suppliers will be forced to compete for government business not only with a favored large business, but also one that eniovs a significant governsubside of free overhead."

The GSA, after listening to this and other objections to its plen, is proceeding with the pilot store anyway; the winning bid will be ennounced in August. NACS has responded by organizing its members into chapters to lobby against further federally fevored stores opening in other cities.

PC Success Stories

In the rapidly changing computer field, most of the news we hear is about the latest products, the most experimental applications. and the questions end problems that follow in their wake. Sometimes it seems that there's nothing going on between the points of anticipation and obsolascence.

Within this whirlpool of activity, some good must come from computers. Somebody out there must be using a PC to do e necessary tesk-end it does the job very well, thank you. But we hear about it only 8.3 percent of the time. When a computer works dependably, it gets taken for granted.

November is the month of Thanksgiving. In the spirit of that holiday. PC invites readers to reveal the reasons they've found to be thankful . . . for their computers. If a PC has made your work easier end your life more enjoyable in some wey, please tell us how. The November issue of PC may include your experience in a selection of "PC Success Stories."

Please send your good news to: PC Success Stories. PC Mozozine, One Park Avenue, New York, NY 10016.





PC Rations

If you've tried to buy an IBM PC or XT letely, you know that there's a shortage of these popular machines, IBM's production hasn't caught up with the orders pleced at its expanded network of outlets selling

personal computers The dealers were first told that they would receive an allocation of only 65 percent of the machines they'd ordered. In many cases, dealers were sent only 25 percent of what they had asked for Now IBM advises that a customer will have to wait up to 6 weeks for a PC to arrive at en IBM Product Center. It could even take 6 months if the order was placed at a branch sales office

This should be e great season for diversified dealers who can deliver other IBM-compatible systems to their customers without delay. While confidence in the IBM name has ettracted many new buyers to the microcomputer marketplace, easy availability will make machines with unfamiliar names seem more appealing

Update to WordStar Update

that registered users of WordStar, MoilMerge, and SpellStor who wish to upgrede to the new 3.3 versions must consult their dealers rather than the manufecturer, despite whet was previously announced (see "WordStar 3.24 And 3.3: MicroPro Does It Again . . . And Again" PC, Volume 2 Number 1). Upgrades for each of the three programs will normally cost \$85, but users who bought earlier versions after April 1, 1983 will

MicroPro recently announced

receive the new ones free on showing proof of purchase As the buck gets passed to the dealers once again, we wonder what use MicroPro over intends to make of its file of user registration cards

-Stephen Mones

PC-Communiqués





Stop the Presses!

We received a press release with the following headline: "NUMBER OF MINICOMPUTERS & MICROCOMPUTERS AUCROCOMPUTERS ACCORDING TO INCREASE ACCORDING TO REPORT BY EXPERTS."

These same experts must also have the inside line on John Paul Il's religious preference and the occupancy of Grant's Tomb.

This Land Is My Land ComputerLand, the national

microcomputer retailer, has filed suit against Softwareland, which opened three stores this june in the Southwest. The party of the first part claims that the party of the second part infringed upon its trademark by using the suffix "hard" in its name. We wonder if Disney Corp.'s

We wonder if Disney Corp. s lawyers in Anaheim plan to take ection against the lot of them—or would thet be too Mickey Mouse?

Computer Culture

If you've never looked et your PC with the same awe as you would an ancient dinosaur bone or a painting of haystecks by Monet, there are now museums that may change your point of view.

change your point of view. The 4-year-old Camputer Museum, located in Digital Equipment Carp's Matthews, Massachusetts bradequarters, transac computer technology from the birth of the ebscuss through the birth of the ebscuss through Some significant hardware from the computer's history is on display, including the 96-ton ENIACIV and of the few Apple I machines to survive the rebate program following the introduction of the Apple II. Museum is free. It is open Sunday through Friday from 1 to 6 p.m. until November: thet month tha museum will close its doors while moving to larger quarters on Boston's Museum Wharf. Until then, it's located at One Iron Way, Marilborn, MA 01752, and can be called at (617) 467-4036. Computers have gained access

Admission to the Computer

Computers have gained access to an measures this year as well. You may recall the terminals and white plaster burnan figures that graced the Time magazine cover as a trubute to the "Machine of the Veat." That sculpture west the even't of George Segal, whose life-size plaster cast one based on the Veat. That sculpture west the even't of George Segal, whose life-size plaster cast one based on the Veat. The sculpture was the Machine of the West of t

Museum of Science, then be

displeyed at the Chicago Museum of Contemporary Art; the sculpture may come to cultural centers in other cities as well.

The Eagle Weeps

The microcomputer community was stunned by the sudden death of Dennis Barnhart, the 40-year-old president and C.E.O. of Eagle Computer, Inc. On June 8, 1983 Barnhart lost control of his red Ferrari, broke through a guard rail, and crashed into a ravine only a block from the company's Los Gestos, Californis headquaters.

Barnhart's occident occurred on the day Eagle made its first public offering of stock at \$13 a share. At the news of the president's death, Eagle executives halted sale of the stock and reorganized the company's leadership according to the contingency

president's death, Eagle executives halted sale of the stock and reorganized the company's leadership according to the contingenc plan.

Cherles Kappenham, Eagle Computer's founder, succeeded

Barnhart as C.E.O.; Ronald Mickwee, formerly an executive vice president, stepped in as the company's president. After a week deley, Engle offered its stock on Juna 15 at an opening price of \$12. In a few devs all 2.75 million sheres hed sold out.

Despite the blaw of Barnhart's death, investors seem confident in the continued growth of the company he helped build. The Eagle will continue to fly. Sprechen Sie PC

IBM officially introduced its PC to Germany on January 19, 1983, Computer Personlich measure evaluated the machine in March and gave it a "nein."

What went wrong when crossing the Rhine? First, it seems that IBM's development team neglected to take into account that Germany uses the DIN standard to represent characters. DIN characters have only 7 bits, so the last bit of the PC's 8-bit character is dropped when used in most German applications. For example, most German printers can't generate umlauts when run from WordStor on the PC. Computer Personlich recommended that IBM change the keyboard decoder, the BIOS ROM, and the character generators to better suit the German language. The reviewers also complemed that the PC's manuals were so badly translated as to

incomprehensible. They suspected that the job on the PC-DOS manual has been done by a nonprogrammer. In response, IBM has promised in rework and re-edit its documentation.

While IBM goes back to its language labs, several manufacturers of PC-compatible systems are already making their marks in Germany



Don't GetBurned! of PC screens are already st

Does a ghostly maze foom uminously on the screen as you type your latest novel? Can you assignments even when your machine is turned off? Bad news: Your monitor is a victim of an irreversible malady-plinsphot burn or etching

Like many worksholics, the friendly phosphors on your "burned out." When not lit up, they leave "etched" image. A lot

inverse video is the worst

culprit. The most intense etching we've seen has been on screens used to run spreadsheets with inverse-video headings or word processing programs that keep line 25 burning with a status

Don't expect help from IBM. The company calls screen etching "a function of use" and won't cover it under its warranty or service agreements. This is slightly disingenuous,

considering that there's no warning in the Guide to Operations and

virtually universal feature of the programs it markets. If you're covered by a service agreement and your present monitor goes bad in a way IBM does consider its fault, you should refuse to accept a replacement that shows the slightest evidence of etching.

To prevent the problem, you could switch to an Apple Lisa or another computer that spares the

phosphors by blanking the display after about 5 minutes of inactivity. But if you're stuck on your PC, keep the monitor's brightness and contrest controls at the absolute minimum level you need to work comfortably Turn the monitor off, or at least turn the brightness down, when computer is still on. Avoid Inverse-video status lines if at all possible. If you've got a color monitor or TV set, change the border and background colors now and then.

"C'mon, Dad!" hypnotized kids whined in the days of the

first video games as they pleaded for 10 more minutes of playing a hume Pony-elike, "It's not connamess up the TV!

As usual, Dad was right. -Stephen Manes

Latest Scoop On IBM's "Popcorn" and "Peanut"

The prematurely, if only partially, denied unofficial semiconfirmation of the almost official report of the tentative announcement of the quasirelease of the so-called new models, as it were, of the IBM PC

has now been informally denied. The belated ncement of the ormal denial of the preturely confirmed refusal the parties involved to say anything is to be followed by a partial report of an official refusal to deny the rumor of a confirmation. (Apologies to J.B "The

Beachcomber" Morton for the





Gold and Platinum Diskettes

In the must business it used to be hot over if a record sold to the true of \$3\$ million—that make it adial gold. Nowadays, a board is perign modes must like records the platform—million copies sold. Mega-figures can be found in the software business, though without the same glitter, international Computer Programs, inc. of Sociolads, Articosa, gives awords to Sortware podict with with cannatilative whelesals revenues of \$5\$ million or most. Il presented to Sortware podict with cannatilative whelesals revenues of \$5\$ million in paids, including the top prine for Total, a mainfrance of the sound of the sold of th

Among the microcomputer mega-sellers is WordStar, which passed the \$25-million mark last year. This spring, VisiGale reached the same level and dBose II qualified for the \$10-million award. So what's the prize that honors the "top of the flopps"? Only a plain plaque, sad to say. The platinum diskotte has yet to arrive.

the 82720 Graphics Display Controller to put true proportional spacing, subscripts, superscripts, and multiple fonts on the screen. Don't expect to see this one in a hurry, though. Right now it costs about as much as Inne's major microprocessors—a little bit pricy just to make subscripts (like H₂O) and fluifics come out right.

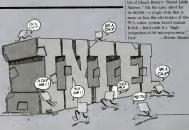
intenting pracy past or index subscripte (like H,0) and italics come out right. Finally, there's a humbling note for IBM PC owners who lood it ower users of older muchines by smughy humming a bit of Chuck Berry. "Sweet Little Sixteen." On the spec sheet for its 80188—a single chip that its morn or less the electronics of the PC's entire system boord (minus RAM)—Intel calls it a "highlection of the property of the property of the special property of the property of the special property of the property of

New Chips from Intel's Block

Arnazing, the stuff that keeps crossing our desks from Intel. Exhibit A is a spc: sheet on the 82720 Graphics Display Controller. Turns out this is Intel's version of the powerful NEC 7220 chip that controls the displays of just about every major new Japanese micro around.

Will this Americanized chip be the heart of a new higherresolution IBM color/graphics board? We didn't even bother to phone Big Blue for the mandatory "no comment."

There's also Intel's own 82730 Text Coprocessor. It'll work with



More PC-DOS 2.0 Woes Microsoft is leading us into the future with PC-DOS 2.0. all right. but it can be a hazardous journey. Many 2.0 features are straight out of Xenix, especially the hierarchical directory capability. Unfortunately, it doesn't have Xenix's log-in ID's and permission levels to protect

against dumb or

OH, DAHLING

accidentel commands that can result in catastrophe.

With PC-DOS 2.0 you are, in Unix/Xenix terms, the super-user. This means that you or anyone else can clobber the system any old time, from within any directory or subdirectory. Let's say you're in a subdirectory. and you misinformedly type

ERASE \ because you want to eliminate all the files in that subdirectory. The

system asks, "ARE YOU. SURE?" and then-as if by magic-all the files on your disk that are not in directories disappear. These include

COMMAND.COM and everything else that isn't e hidden file-but not the directories. They have to be empty first; then only the Remove Directory (RD) command will erase them Having the ability to erase

master directories from subdirectories is bad anough, but the ease with which you can wipe out everything constitutes a major design flaw.

PC-Communiqués Do you have news, gossip, or unusual computer tales for

PC-Communiqués? We will pay up to \$50 for each submission used. You must include your name, address, and telephone number with the item. We will preserve your anonymity if you wish. All submissions become the property of PC and are subject to editing. Our User-to-User section also publishes and pays for readers' submissions: that section features tips. problem solutions, and short programs or routines. Pleasa send submissions to the appropriate department-PC-Communiqués or User-to-User-at PC, One Park Ave... Naw York, NY 10016.

Computer Chic

Computers might not be as rare and ettractive as diamonds, but thay can be equally expensive. The Beverly Hills Computer Store promotes the personal computer's position as a status symbol by displaying PCs. Coronas, and other computers in a jewelry store ambiance. Machine and circuit boards repose on black velvet in glass cases, tastefully festooned with diamonds.

Owner Murray Coralnick maintained the fine local tradition of unlisted telephone numbers by declining to reveal the names of celebrities who have patronized the store. He said that most of them were sansitive about exposing their inexperience with computers. Several had arranged to visit the store after hours to ascape the public eye. "Once any of them get good at using the computer," Garolnick added, "I'm sure they'll be eager to let the world know about it."

The Beverly Hills Computer Store is located at 9666 Santa Monica Blvd., Beverly Hills, CA 90210. (213) 276-6100.

Software Sampler

SoftLink Corp. is leaving no disk unturned in its search for markets. This Senta Clara, California company has arranged with Sysgen. Inc. to supply encrypted versions of Chang Laboratories software on the back-up tope in its mass storage devices

Purchasers of Sysgen's hard disk with streaming tape back-up systems will be able to test nine programs, including MicroPlan, ProfitPlon, GraphPlon, DocuPlon, MemoPlan, FilePlan, and DotoPlan, free of charge, If a user likes what he sees, he can arrange with a retailer to pay for the software and be issued a keycode that unlocks the full program. If he doesn't like the software, though, he can simply eruse the tape. The whola set of nine programs has a list price of about \$3,000.

SoftLink normally sells encrypted trial versions of programs for \$49.95 each. It waives this fee for purchasers of Sysgen's systems-anyone who pays \$995 to \$3,795 for a peripheral device is likely to

Chang Laboratories and Sysgen, Inc. expect that SoftLink's marketing matchmaking will stimulate their sales of software and hardware, respectively. Richard Newsome, Syssen's marketing director, said that this softwere "giveaway" should benefit everyone in the marketing chain-except for the distributors, who will be bypassed in this arrangement. He added that an encrypted version of nearly every program now available for the PC could fit on just one of Sysgen's 20-megabyte tape cartridges.

PC-Com

A Different Sort Of "Computer Network'

If Oakland University of Rochester, Michigan has its way. HBO, MTV, and Showtime will have to make room for the world's first cable television channel devoted exclusively to computer information and instruction: "Your Computer

Channel." The channel would provide dally 24-hour instructional programming and interactive two-way services, including payper-view, access to Dow lones I and II and The Source, video and video-audio teleconferencing, electronic mail, energy monitoring and management. automated water meter reading. and security and medical monitoring.

Subscribers would be able to rent or lease computer equipme from local retailers and cable operators on a monthly basis. Manuals and other learning materials would be provided by participating cable operators, schools, and computer companies.

Oakland University plans to conduct a pilot project on one or more two-way interactive cable communications systems now being built in Oakland County. Michigan. If the project is successful, Your Computer Channel will be on the air by the Fall 1984. If you're interested in knowing more, write to Audrey Marriner, Cable TV office. Oakland University, Rochester MI 48063, or call (313) 377-3272.

IBM Maintenance Options

evailable from IRM for service of its PCs and XTs. A variety of options is offered, including arrangements for on-site service and for carrying in units to a nearby Service/Exchange Center. The least expensive agreement bas users mail troubled elemen to IBM's Regional Repair Centers

For further information, call (800) 428-2569; IBM owners in Hawaii, Alaska, and Guam can call (312) 966-7451 collect.

The First Computer Manual

We should be gled that one man didn't spare the rod. Scottish mathematician John Napier (1550-1617), best known for inventing logarithms, is also argusbly the father—or perhaps grandfather—of the computer age. Why? By virtue of a set of mechanical calculeting rods he invented, nicknamed "Napier's Bones."

SONE

But Nepier deserves credit (or blame?) for another innov He wrote the world's first computer manual, a book entitled Robdologice (latinized Greek for "the study of rods"). Measuring only 14.5 by 8 centimeters (about half the page area of PC manuals), it explains methods of manipulating the "bones" to perform lightning-fast calculations. The engraved rectangular rods, with marked and numbered surfaces, produce results in the nowfamiliar binary form. Nepier compiled this primordial computer documentation in 1617, the year of his deat

Jeremy Norman, a San Francisco-based antiquarian, owns one of the few privately-held copies of Rabdologice-his asking price is e paltry \$9,500. Norman has collected information on the history of computing devices for 20 years, starting "before it was fashionable." He notes that, although calculating devices existed in India and Persia much earlier, Napier's was the first such machine in the Western world-no bones about it.

"I HAVE NO sympathy nor belief in the idea of a computer being able to replace a man, a computer being able to replicate itself, or any of these notions people have."

> Thomas J. Watson, Ir. former chairman and C.E.O. of IBM in an interview with Jack B. Rochester



IF YOUR DATA'S WORTH REMEMBERING, IT'S WORTH PROTECTING.



POWERMAKER' MICRO UPS

A split-second blackout or a sudden voltage sag can shut down your small business computer, completely wiping out critical data. Inventories, payrolls, receivables — whatever is in the memory may be lost instantly.

Although this type of data is just as important to a small business as it is to a large corporation, blackout protection has always been far too costly for small business applications. But now there is the Powermaker Micro UPS, an inexpensive standby power source specifically designed for small business computers.

This new rechargeable power system provides up to 35 minutes of steady sine-wave power, enabling even the most sensitive small computers to ride through blackouts and voltage sags completely unaffected.

Why sine wave power? Because squarewave power impairs the performance of many printers, viewing screens and timing circuits. Powermaker produces a sine wave that exactly matches the wave shape of commercial power. ensuring compatibility with any computer system.

In addition to providing highly reliable blackout and brownout protection, Powermaker also protects against electrical noise, one of the major causes of computer errors and system malfunction. Powermaker is portable, completely automatic, maintenance free and plugs into any standard 120 outlet.

No matter how small your computer, your

data is worth remembering. Protect it with an affordable Powermaker Wicro UPS. TOPAZ 9192 TOPAZ WAY SAN DIEGO, CA 92123-1165 PHONE: (619) 279-0831 TOPAZ WAY 1910 133-1576

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SOLUTIONS TO POWER PROBLEMS**

callus

CIRCLE 492 ON READER SERVICE CARD

HANG ON TO YOUR HAT, CHARLIE...



THE CORONA PC'S ARE HERE.



you everything you've ever wanted in an IBMcompatible PC and more. For a great deal less.

Compatible and more.

The Corona PC is a 16-bit microcomputer based on the 8088 microprocessor, just like the IBM PC. And like the IBM PC, it runs any software that conforms to the IBM standard.

But unlike the IBM PC, the Corona PC comes with 128K of memory. Supports up to 512K on the main board. Includes a 320K floppy drive, a communication port, a printer port and an improved IBM PC keyboard.

Both the desktop and portable Corona PC's include high-resolution monitors and built-in graphics. Higher character definition makes both models easier to read, and our 640 x 325 pixel high-resolution graphics are over 60% better than the

IBM PC. It's a complete system, the standard for microcomputing in the IBM-compatible world.

You can take it with you.

And unlike IBM, we have a portable version.

Its high-resolution, high-contrast 9" display is easy to read. It has all the power and features of our desktop, but lets you take it to the office next door, across the country or just conveniently tuck it onto a comer of your desk.

More expandability.

You may never add a thing to your Corona PC because we've built in so much capability.

But just in case, we've built all the important components into the main system board, leaving the four expansion slots free. And provided an extra large power supply to support any capabilities you may want to add in the future.



RAM-disk for incredible speed.

Our RAM-disk software lets you treat an area of your computer's memory as if it were a disk drive. So you can copy your programs and data into memory, then watch your work get done faster.

More software.

The Corona PC includes the MS-DOS operating system and comes with GW-BASIC, the MultiMate' word processor and the PC Tutor² training course. So you can start being productive immediately.

So you can stan being productive immediatery.

And you can run Context MBA? BASE II!

LogiCalc⁶ and LogiQuest⁸; the EasyFamily⁸. Wordstar⁷
and the "Star" family, the SuperWare⁸ series, T.I.M.,
the VisiSeries¹⁰ and Perfect Series¹¹ of programs and
most other popular software.

And it improves your bottom line.

The Corona Portable PC* is \$2,545, the desktop

version is \$2,595. Both about a thousand dollars

less than the equivalent IBM PC. For more information, contact Corona Data Systems, 31324 Via Colinas, Westlake Village, CA 91361. (213) 991-1144. Call (800) 621-6746

Or better yet, just grab your hat and head to the nearest Corona PC dealer for a very convincing demonstration.



Corona Date Systems 1963 1 TM Softword Systems 2 TM Comprehens theure Support 3 TM Content Management Systems 4 TM Ashton-Tate (M Software Products International 6 TM Information Unlimited Software, TM Managen, 8 TM Sorcian Corp. 9 TM Innovertive Software, 10: TM Vision TM Endors Software No.

CIRCLE 204 ON READER SERVICE CARD

If you stick with timesharing after reading this ad, you haven't read this ad.

Typically, financial planning on a timesharing service runs \$2,000 a month and more. Month after month after month.

And it doesn't take a spreadsheet to figure that as a \$24,000a-year-after-year expense.

The incredibly cheap alternative. The Financial Planner™ from Ashton-Tate

can stop this cash drain once and for all.
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The Financial Planner has enough depth to solve the most complex business problems you can foresee, yet can be used almost intuitively.

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Editing and report-writing are an integral part of the package, and you can preview results on the screen, then produce presentation-quality financial reports directly.

And when you have your models and reports just right, you can automate them so even your President can run them.

With the Planner, you produce P & L forecasts and financial consolidations in minutes, Explore

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"what if" alternatives. Analyze new business ventures and mergers. Plan real estate acquisition and development. And fine tune operations until you reach the financial objectives you've set.

It's one of the most comprehensive business tools available on any computer. All for a fraction of what you've been spending on timesharing services to do the same things.

For the ardent skeptics.

It may sound too good to be true, but you can check out the Financial Planner with no financial risk.

Run through a hands-on demo at your nearest computer or software store. Then take a packed home and use it for 30 days on your IBM PC or CI/M microccomputer. If it's not everything we said it was, just return it and you'll get your money back.

For the name of your nearest dealer, contact Ashton-Tate at 10150 West Jefferson The Boulevard, Culver City, CA

Boulevard, Culver City, CA 90230. Or better yet, call (213) 204-5570 today. Time's a-wasting.

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Planner'

ASHTON TATE ■

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DATABASEZERO

THE COMPUTER ZONE.







A quick check of the "Things We Didn't Tell You Yet" section directed Homer back to the installation diagram (which seemed slightly different than he remembered it). The second arrangement proved more successful.



Now it was time to try out the DRASTIC Training Kit. The salesman had assured him it was the best on the market and, "I gave one of these to my mother for Christmas — she's ninety — and now the's nahwarking with the Boatsann"





Envision a single high-speed communications board with integrated, easy-to-use software that emulates any terminal.



It's not just your imagination. It's Linkup.

At ITI, we know your data communications must be fast, accurate and inexpensive. Our engineers faced the same communications problems you face. That's why they designed Linkup™ for the IBM PC

With Linkup, you have a highspeed, programmable communications processor integrated with user-oriented software that provides cost effective access to an international network of host computers, terminals and other personal computers. You'll be able to transfer text, graphics, facsimile images, telemetry and program files as easily as dialing a phone number.

Communication modes support high and low speed access to computing and data base services, electronic mail, order entry, credit verification, tele-conferencing and direct marketing. Linkup is the only

communications hardware vou'il ever need.

A single plug-in hardware module with the standard software emulates TTY, ASCII block mode, IBM 3101, IBM 2780/ 3780, DEC VT 52/100 and Tektronix. IBM 3270 and 5250 are scheduled for mid-year introduction. Terminal emulation modes are changed by a single keystroke without changing diskettes and switching modem cables to different hardware interfaces. And most importantly, the same familiar user command set appears in all modes.

Linkup grows to meet your

changing needs. Future terminal protocol emulation software will integrate into our programmable hardware controller. And, Linkup's highspeed data throughput will allow you to take full advantage of increases in common carrier transmission line speeds with no modification. Linkup is available for users and systems developers who wish to integrate our com-

munications capability into their unique systems, on a select OEM basis.

Linkup is cost-effective.

Linkup's single communications board does more than several others combined, leaving your computer's precious board slots open for further applications. And its powerful MC 6809 coprocessor chip handles all communications tasks, freeing the PC to service the user interface.

Faster, more accurate transmission means lower costs.

Linkup's integrated design architecture reduces connect charges by transmitting and receiving data at speeds up to 19.2 Kilobaud asynchronous and up to 56 Kilobits per second synchronous without the loss of data throughput normally associated with such speeds. Reduce file storage charges on a remote computer system by transferring the file at high speed to the PC's disk, then print off-line.

Linkup utilizes block error control.

The module checks each line for error as it's received, retransmitting only those lines in error. instead of entire pages. That saves connect time and character transmission charges.

Our innovative fill-in-theblanks technique overcomes the tedium of question-answer interrogation and menu approaches.

The user simply enters phone numbers, passwords and iob file blanks form. Communication options and commands are displayed on the screen form and selected with a single keystroke. The user is not forced through a series of lengthy menus just to change a single item.

names on a consistent fill-in-the



Linkup works around the clock so you don't have to.

Linkup automatically executes tasks. It dials, signs-on, runs a job unsupervised and maintains a log of its activities. Unattended operation at night, on weekends and on holidays provides the lowest rates from both common carrier and computer services. It uploads, downloads and does printouts while you're away. And when you return, your data is ready and waiting, so you can put your time to its best use.

if you want to communicate, call ITI toll-free 800-431-3460 for additional information.



Information Technologies Inc. 7850 East Evans Road Scottsdale, Arizona 85260 16021 998-1033

IBM PC is a trademark of International Business Machines Corporation.

Linkup Specifications ontinuous throughput of 56 Kbps Synchronous. 19.2 Kbaud Asynchronous Terminal Emulation Mode TTY, ASCII Block Transfer, DEC VT 52/100, IBM

3101, IBM 2780/3780, and future options include 3270 5250 Textronix ASCII, EBCDIC and Binary with enhanced user commands, e.g. SEND, RECEIVE, APPEND,

Dialup, Log-on, Job Execution, Answer, Alert, Unattended Job Scheduling, File Upload Download

103, 212, 201, 208 Bell compatible, Hayes, Vada Rixon and Omnitec smart modems, or user defin Bus interface: IBM PC bus compatib

PC Configuration: PC DOS, 64 Kbytes RAM, 160 KB Floppy; monochrome display minimum. Also supports IBM compatible hard disks, color displays and printers. rintz" Print Spooler Postmaster" Electronic Mail Audit" Billing Summary

\$795 each, including TTY and ASCII

Test drive our mouse.

It's no secret. This is certainly "The Year of the Mouse."

And the uproar is justified.

This "see and point" interface is the most natural, powerful and efficient way to interact with vour computer.

And Mouse Systems' optical PC Mouse, now available with software support for the IBM PC. is easily the best of its breed; easily the best at making your computer userfriendly.

Grasp The Future of PC Technology

Slide our PC Mouse across its deskpad. It's optical. There are no moving parts. Your cursor instantly moves across your CRT in response. No other device gives you

such total, accurate control over cursor positioning. The ergonomically designed PC Mouse is so

smooth and natural in its movements, you'll soon be using it almost subconciously. Your attention can thus remain on the screen and not on the keyboard, and your concentration

brisk moves in any direction

dramatically. PC Mouse lets you use this new freedom to take full advantage of today's "visual" software

will be increased

products. (For a truly enlightening experience, ask your dealer to demo PC Mouse with IBM's Personal Editor)

PC Mouse vs. The Keyboard

Named Mini/Micro's most significant new product of 1982, PC Mouse lets you bypass your keyboard

for instant menu selection and function activation. And PC Mouse requires no changes in your

existing software. All cursor-related functions in 1-2-3, WordStar, VisiCalc, and other popular programs are replaced by the mouse.

In one darting stroke, you eliminate the pondering and second-guessing of typing complicated command codes.

For systems designers and OEM's PC Mouse's potential is staggering.

Simplicity, Itself

Just attach the PC Mouse to your PC's RS-232 port. Each of the three buttons is user-programmable. giving you nine different

functions at your fingertips. And our software compatability assures instant system integration and simple start up.

Get It Now

PC Mouse is immediately available for \$332.00 including control software and all necessary hardware for your IBM PC.

For ambitious software developers, the ontional \$40.00 MouseWindow™ software nackage includes routines to do

> high resolution graphics and "pop-up" windows. An OEM version of

PC Mouse can also be supplied in quantity now, configured to your custom specifications.

For more details see your dealer, or contact Mouse Systems at 2336H Walsh Avenue, Santa Clara, CA 95051, Telephone (408) 988-0211 or Telex 467848.

Making Computers User Friendly.



VesiCalc is a trademark of VisiCorp-WordStar is a trademark of Micro-Pro, Intl. 1-2-3 is a trademark of Lotus Develope IBM and PC are registered trademarks of Internal

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crystal-controlled accuracy utility software included

only \$149 each

ASSTEA is beding the very with timely new products for IBM Personal Compilers. The Sect and TeC-Lick two was described as the control of the Compilers of the Sect and TeC-Lick two described with IBM Personal Computers and will fit the small dots in the XI.

The Sect and PIC-Lick and a ceck relament to the standard asynchronous described by the Compiler of the Comp



APSEK MULTI-FUNCTION CARD

- Up to 256k Parity-Checked Memory
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- · 6 ft. External RS232 cable included
- Parallel Printer Port
- Clock/Calendar Software Includes:
 - Time/Date Set, Electronic Disk.

Print Spooler and Diagnostics



PIC-1

PARALLEL PRINTER PORT AND CLOCK/CALENDAR

- may be used for parallel data input now includes Print Spooler Software CLOCK/CALENDAR

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SIC-1 Serial Interface/Clock	\$14
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AIC-256-03 with 192k	509
AIC-256-04 with 256k	57
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AIM-256-09 64k upgrade kit

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HERE'S WHAT
OUR NEW, 1200-BAUD,
DO IT ALL,
ONE STOP SHOPPING,
DON'T BREAK THE BANK
MODEM FOR YOUR IBM PC
LOOKS LIKE:



That's because it's inside Where any modern connecting your Personal Computer to the telephone network should be. And where you won't have to worry about all those little boxes, couplers, cables and power cords getting in your way. Or being knocked off your deliver.

cell your cleak.

But just because the PC:ntellModem is out of sight, dosent mean I'll ever be out or individual continue to be impressed with its do-it-all capabilities for years to come. I capabilities for years to come, automatic caliang, and autor repeat caliang, for selectively calling people or other computers formly our our computers delephone discharged to the capabilities of the capabilities of

More than just a modern.
Even more impressive is the PC:
IntelliModern's ability to integrate both
voice and data communication.
By plugging a regular handset into
the back of your PC, you can

PC:Intel®Modem is a trademark of Businesa Computer Corporation IBM is a trademark of International Business Machines Corporation So, where is it?

now switch between talking or listening and sending or receiving data-without having to hang up, re-dial or plug and unplug a lot of cables. So making connections is now

much faster and more convenient.
The PC:IntelliModem comes complete with
everything you need to start communicating

immediately. Besides its sophisticated Bell 212A-compatible hardware, the PC:intelli-Modern includes a "triendly" software package with screen menus to quide you during use, plus

to guide you during use, plus complete written instructions for reference. And all this one-stop-shopping convenience is included in our modest price: \$499. Which shouldn't break anybody's heak.

anybody's bank. So if you're ready to turn your PC into a fast-talking data communications tool, ask your local IBM dealer.

ask your local IBM dealer about the Bizcomp PC:Intelli-Modern. It's a whole lot more than a modern. Even if it looks like a great big nothing.

532 Weddell Drive Sunnyvale, CA 94086 408/745-1616

CIRCLE 171 ON READER SERVICE CARD



IBM PC-related instruction ranges from incoherent lessons on cassette tape to a weekend at computer camp in Wyoming. In the absence of standards, it's a good idea to ask lots of questions before you sign up.

In Search Of Computer Training

Are you an old-fashioned guy or gal? Would you rather have a real flesh-andblood teacher accompeny you through the trauma of learning how to use a PC or a complex epplication program?

For people who are sick of staring et unhelpful manuals and went real people to help them learn to communicate with their machines, computer courses are available in most perts of the country, and many are specifically aimed at usars of the IBM PC and PC software. The courses range from college-level instruction to informal sessions in computer stores or

through users groups.

The computer education business for individuels is growing rapidly. The future may hold standardized courses nationally. One large retail store claims to have been so succassful with e treining program thet it now plens to market it nationwide. At other stores, treining may be less organized; some users told PC Mogozine of teechers who mey have known tha matarial but were unable to make themselves understood to the uninitiated. One woman reported an instructor who "couldn't tell e keyboard from his big toe.'

Audio/Visual Instruction

In the area of video cassettes, homework and TV are

no longer adversaries. Alternatives to classroom instruction ara also available. The two principal forms are

disk-based and video cassette-based. You can also find audio tape instruction. Most of the disk programs are interactive; they ask for your input from the key-

board before edvancing through chapters. PC MAGAZINE 91 AUGUST 1983

They ranga in complexity from introductions to using the computar to tutorials on DOS and BASIC to specific applications programs including VisiColc, WordStor, dBose II and Multiplan.

The video cassette offerings can range from elementary lessons ("How to Find the Power Switch") to more sophisticated offerings. The cassette player, though, is not directly tied into the computer. (For a glimpse of a system that may combine the two, see "Coming Attractions: The Supar Video Instructor," in this issue.)

Here are some hints on how to choose a

- computer-assistad training packaga:

 Make certain the disk or cassette is compatibla with your computer. If you have a PC-XT, does it take advantage of
- that machine's advanced features?

 Be sure that the version of tha program to be axplained is the same as the one you own. For instance, there are three versions of PC-DOS: 1.0, 1.1 and 2.0. Them are many versions of WordStor: 3.1, 3.2, 3.24
- and 3.3 among them.

 If you're purchasing a video cassette,
 make certain you receive the proper format—Bata or VHS. If you're buying a disk
 for the PC, don't accept a double-sided
 disk if you have single-sided drives.
- Find out as much as possible about the instructional level and style of the program. If you don't want to sit through 5 minutes of bow to insert a disk properly in order to get to a point of advanced programming, beware of programs that are rigid in their insistence on progressing from Chapter 1 through Chapter 10 with no detours and no double-back.

---Corey Sandler

VisiColc

How, than, do you find a good computer course? Perhap the best place to tart is where you purchased your computer. If computer dealers dut offer training programs thamselvas, thay may know who does. Another good bet would be member of user groups. (Many are listed in PC Mogazine; your computer dealer are know of others, 18 e waves that user groups

ONE SALESMAN promised us that his Apple machines were perfectly compatible with PCs.

vary greatly in leval of organization, but the good ones are well-informed about what's going on in stores and schools. If you're trying to gathar enough people together to interest someone—a store, a high school, the YMCA—in sponsoring of course, user groups are sure to attract othor fleedgling computarphilas as well. You can also try local libraries or universities, which often post circulars advising people about where they can take courses.

Choosing a Course

Here are some questions you should ask before choosing a course:

What is the format? Is it one you will be comfortable with? Is the course merely a

- lecture, without any hands-on experience, or will thare be PCs or PC-compatible computers available? Which do you feel offars more for your needs?
- How many students per computer?

 More than two will greatly limit your access. Are you a lonar or do you prefer the buddy system?
- Does the schedule meet yours? You
 may want to take tha whole course in one
 day, or you may want to spraad it out to
 allow tima to absorb the lassons and apply
 them to your specific needs.
 - Is there any way you can use a computer after class for practice? Is there a
 - What are the teacher's qualifications. Are the instructors also sales peopla? Do they have technical degrees? If you're interested in business applications, do they have practical experience in applying the programs they preach? Are they talking about spreadabet strategies for a company the size of IBM when you're trying to manage the corner candw store?
 - To islange the content that y source before the finally, make certain that the course you choose really does apply to you meeds. One selesman promised us that his Apple machines were perfectly compatible with PCs. (They're not, of course.) If you enroll in a course that mixas Apples and IBMs or any other microcomputer, check that all the course materials and demonstrations cover all models and demonstrations cover all models.

The listings provided here are only a scatterad sampling of short-tarm computer education courses around the country. The courses have not been raviewed. Good luck and good grades! /PC

Classes

Classes							
COMPANY	COURSE TOPICS	LENGTH	COST	NUMBER OF STUDENTS	NUMBER OF PCS		
ComputarPrep 10057 North Metro Pkwy. East Phoenix, AZ 85021 (602) 944-8258	DOS 1.1 with 2.0 updata WordStor BPI—ganaral ledger —accounts receivabla 1-2-3 T.I.M.	Vz-2 days	\$35-\$175	24 or 12*	12		

*These courses can be taken in either seminars or workshops. Workshops are intended for people with greater proficiency and are taught one-on-one rather than on the buddy system.

COMPANY	COURSE TOPICS	LENGTH	COST	NUMBER OF STUDENTS	NUMBER OF PCS
Accelerated Computer Training 18201 West McDurmott #B Irvine, CA 92714 (714) 660-0455	Computer Fundamentals WordStar BASIC—beginners & advanced Database—beginners & advanced Pascal SuperColc VisiCalc	1-4 days	\$99-\$198	24	12
IBM Product Center 425 Market St. San Francisco, CA 94105 (415) 545-5110	Intro to PC WordStar 1-2-3 MailMerge Multiplan VisiCalc	1/4-1 day	\$75-\$120	8	8
ComputerLand 207 Pitkin St. East Hartford, CT 06018 (203) 528-2114 (800) 922-3276 ComputerLand 111 High Ridge Rd. Stamford, CT 06905 (203) 964-1224 (800) 922-3276	Intro to Word Processing Intro to Batabase Intro to Spreadsheets WordStor dBose II 1-2-3 VisiCalc	14-1 day	\$80-\$200	12	6
Personal Computer Training Center 2120 L St. #102 NW Washington, DC 20001 (202) 466-7604	WordStor assembler Beginner's BASIC dBose II VisiColc	12 hours over 3-4 weeks	\$195	3-10	6
ComputerLand 2777-6 University Bivd. West Jacksonville, FL 32217 (904) 731-2471 ComputerLand 9398 Arlington Expwy. Jacksonville, FL 32211 (904) 721-2233	Intro to Microcomputing Word Processing— WordStor Intro to Detabase Management —T.I.M., dBose II, Visifile Using Financial Spreadsheets —includes 1-2-3	½—4 days	\$50-\$150	10-20	6—PC or COMPAQ
ComputerLand 3224 Peschtree Rd. Atlanta, GA 30305 (404) 237-2080	Intro to PC WordSter BASIC Multiplan dBose II 1-2-3	10 hours— flexible scheduling	\$125	10-24	24

	_		1		
COMPANY	COURSE TOPICS	LENGTH	COST	NUMBER OF STUDENTS	NUMBER OF PCS
Information Science Associates 676 North St. Clair Chicogo, II. 60611 (312) 787-2723	Intro to PC WordStor BASIC Business Programming— beginners & advenced IBM Microcomputer BASIC for Experienced COBOL- Programmers III 12-3 VisiColc—beginners & advanced	1-2 days	\$115-\$365	10	5
Microcomputer Learning Center 120 West Medison #910 Chicago, IL 60603 (312) 332-0419	Intro to PC Word Processing with WordStor Spreadsheets —Multiplon —SuperColc —VisiColc	Seven 1½ hour sessions over 5 weeks	\$125		4
ComputerLand 1003 Meridian Plaza Anderson, IN 46016 (317) 649-1122	How to Use PC-DOS WordStor BASIC—ell levels Intro to Database Manegement Spreedsheets	½−2 days	\$20-\$90	15	PCs and COMPAQs available
Computerland 911A West 37th St. Topeka, KS 66611 (913) 267-6530	Intro to PC-DOS InfoStor SpellStor WordStor BASIC dBose II MoilMerge Multiplon PFS VisiColc	⅓ day	\$50	6	6
Center for Management Development University of Louisville School of Business Louisville, KY 40292 (502) 588-6456	Intro to PC Intro to BASIC dBose II 1-2-3 VisiColc	8-15 hours	\$120\$300	5-15	5
ComputerLand 131 East Redwood Baltimore, MD 21202 (301) 837-5678 ComputerLand 1516 York Rd. Lutherville, MD 21093 (301) 337-5555	assembly Language Programming BASIC Programming VisiColc	7½ hours over 5 weeks	\$50-\$75	Maximum: 25	Lecture formet

COMPANY	COURSE TOPICS	LENGTH	COST	NUMBER OF STUDENTS	NUMBER OF PCS
Center for Computer Applications 334 Newbury St. Boston, MA 02115 (617) 247-0538	Intro to IBM PC WardStar Context MBA dBase II 1-2-3 Multiplan VisiCalc	1/2-1 day	\$125-\$145	8-12	6
Susan Harmon Transitions, Inc. 185 Corey Rd. Brookline, MA 02146 (617) 566-0596	WordPlus for PC WardStar DataStar MailMerge Supersart VisiCalc—beginners & advanced Visifile		\$35/hour	Harman will tutar individuals ar groups on their own PCs.	
Computer Tutor 554 Washington St. Wellesley, MA 02181 (617) 237-6061	WardStar dBase II 1-2-3 Multiplan SuperCalc VisiCalc	2-4 days	\$150-\$175	4-8	8
ComputerLand 22000 Greater Mack St. Claire Shores, MI 48080 (313) 772-6540	Intro to PC WardStar BASIC Programming Dow Jones Communications Saftware Electronic Checkbook 1-2-3 PFS: File VisiCale	1-4 days	\$20-\$100	4-5	2-3
Schaak's Computer Academy Maplewood Mall Maplewood, MN 55109 (612) 770-1027	Intro to IBM PC WardStar BASIC Programming dBase II Multiplan SuperCalc VisiCalc	1/2-2 days	\$25-\$75	20	PCs available
ComputerLand 3640 South Campbell Springfield, MO 65807 (417) 887-2222	WardStar SuperCalc	2 days	\$25-\$35	8-10	8
Clancy Paul Microcomputer Learning Center 101 College Rd. East Forrestal Center Princeton, NJ 08540 (609) 452-0430	Intra ta IBM PC 1-2-3 Multimate WordStar VisiCalc	1/2−1 day	\$100-\$250	4-5	4-5

COMPANY	COURSE TOPICS	LENGTH	COST	NUMBER OF STUDENTS	NUMBER OF PCS
Prodigy Computer Learning Center Colonial Square Mall 229 Route 22 East Green Brook, NJ 08812 (201] 752-6300	Using the IBM PC Word Processing— EasyWriter, Word- Stor or Wordplus BASIC on IBM IBM PC Filing Cabi- net—VisiFile or dBose II Spreadsheets—Visi- Colc or 1-2-3	12 hours over 6 weeks	\$120	12	6
Datel Systems 1211 Avenue of the Americas New York, NY 10036 (212) 921-0110	Using the IBM PC WordStor—beginners & advanced dBase II 1-2-3 SuperCalc VisiColc—beginners & advanced	V₂-1 day	\$45-\$95	5-12	4
IBM Product Center 590 Madison Ave. New York, NY 10022 (212) 407-5909 IBM Product Center 90 Broad St. New York, NY 10005 (212) 407-5909	Intro to IBM PC EosyWriter WordStor 1-2-3 Multiplon VisiColc	⅓ day	\$95	8	8
Instanation 131 Gould St. Rochester, NY 14610 (716) 461-1800	Intro to IBM PC-DOS Intro to Word Processing Intro to BASIC Intro to Business Graphics Electronic Spreadsheets 1 & 2 Intro to National Networks —Interink	1/4 day	\$45	12	demonstration on PC
ComputerLand 1300 S. O. M. Center Rd. Mayfield Heights, OH 44124 (216) 461-1200	WordStor BASIC Programming dBase II 1-2-3	6 hours over 3 days	\$60-\$125	12	12
ComputerLand 8191 South Harvard St. Tulsa, OK 74136 (918) 481-0332	Intro to PC-DOS EosyWriter II WordStor—beginners & advanced 1-2-3 T.LM-3 (with teaching help from a CPA)	V₂−1 day	\$40-\$195	7-8	7

COMPANY	COURSE TOPICS	LENGTH	COST	NUMBER OF STUDENTS	NUMBER OF PCS
ComputerLand 10621 North May Oklahoma City, OK 73120 (408) 755-5200	How to Usa the IBM PC WordStor BASIC—all levels BPI (with teaching help from a CPA) dBose II How to Write a Database Program in BASIC 1-2-3 Visi(olc—beginners & advanced	1/5-4 days	\$30-\$150	24	4
ComputerLand Training Center 708 Southwest Third Ava. #218 Portland, OR 97204 (503) 295-1928	Intro to Microcomputers Word Processing Accounting Communications Database Managamant Elactronic Spreadsheet	1–3 days	\$150	10	10
ComputerLand 9896 Southwest Freeway Houston, TX 77074 (713) 227-7656	Intro to IBM PC WordStar Business Graphics Communications Database 1-2-3 Multiplan SuperCalc VisiCalc	2-6 hours over 2-3 days	\$35-\$95	8-9	9
ComputerLand 888 South Graenville Richardson, TX 75080 (214) 363-2223	dBase II 1-2-3 MBA Multiplan VisiColc		\$30 hour for as many hours as needed —three instructors available for teaching sessions.		
ComputerLand 1808 136th Place NE Ballvue, WA 98005 (206) 643-6262	Intro to IBM PC WordStar 1-2-3 Multiplon VisiCalc	1/2−1 day	\$75-\$150	16	10
ComputerLand 3502 East Washington Ava. Madison, WI 53706 (608) 833-8900	Intro to Microcomputers Word Processing Learning BASIC Database with PFS:File VisiCalc	6 hours over 3 days	\$45-\$130	16	8

COMPANY	COURSE TOPICS	LENGTH		NUMBER OF STUDENTS	NUMBER OF PCS
Jackson Hale Personal Computer Resort Star Route Box 362A Jackson, WY 83001 (800) 443-8616	Intro ta the IBM PC	18 hours	\$285	10	5

Traveling Lecture

Traveling December							
COMPANY	COURSE TOPICS	LENGTH	COST	NUMBER OF STUDENTS	NUMBER OF PCS		
SoftwareBanc 661 Massachusetts Ave. Arlington, MA 02174 617-641-1241 800-451-2502	Intro to dBase II Programming Advanced Techniques 1-2-3	4 days	\$175/day	200	Lecture format, with course materials provided.*		

*This is a traveling lecture series, with the following schedule: Aug.: Ancharage; Sept.: New York; Oct.: Chicaga; Nov.: Dallas; Dec.: San Diego

Disks

COMPANY	PRODUCT	REQUIREMENTS*	COMPATIBLE WITH	COST
American Training International (ATI) 3770 Highland Ave. #201 Manhattan Beach, CA 90228 (213) 546-4725	ATI traiting Power Series: PC-DOS EnoyWhite II WordStar Benchmork dibon II Eosy Pilentent MR-STC Microplen Multiplen SuperCol Visitode Visitode Visitode Visitode Visitode	64K 1 disk drive	XT COMPAQ	\$75.00
Cdex S050 El Camino Real #200 Los Altos. CA 94022 (415) 964-7600	How to Use Your IBM PC IBM PC DOS 2 EasyWhite I 0 EasyWhite I 0 EasyWhite I 0 How To I 0 House I 1 Managing Your Business with 1-2-3 Managing Your Business with Multiplan Managing Your Business with Supercalc Managing Your Business with Supercalc Managing Your Business with Supercalc Managing Your Business with VisiColic Managing Your Business with Advanced VisiColic	64K 1 disk drive	XT COMPAQ	\$69.95

*All disks are compatible with the IBM PC.

COMPANY	PRODUCT	REQUIREMENTS*	COMPATIBLE WITH	COST
Alphanetics P.O. Box 339 Forestville, CA 95436 (707) 887-7237	IBM BASIC Course	64 K 1 disk drive color board opt.	XT COMPAQ Columbia (any MS DOS)	\$39.95
Comprehensive Software Support 2316 Artesia Blvd. Redondo Beach, CA 90278 (213) 318-2661	PC Pal PC Tutor—more advanced than PC Pal	64K 1 disk drive		
Computer Systems Research 40 Darling Dr. Avon Park South Avon, CT 06001 (203) 678-1212	IBM PC Primer— with 5 disks	128K 2 drives	XT DOS 2.0	\$900
Individual Software 24 Spinnaker Pl. Redwood, CA 94065	PC Instructor Professor DOS	PC DOS 1.0 or 1.1 XT 64 K XT DOS 2.0 XT 96K		\$44.95 \$59.95
TexaSoft, Inc. 3415 Westminster #100 Dallas, TX 75205 (214) 369-0795	Your Personal Computer Tutor	DOS 1.1 or 2.0 64K 1 disk drive color or mono	COMPAQ Columbia	\$59.95

Videotape Tra	aining Programs			
COMPANY	PRODUCT	TIME	COMPATIBLE WITH	COST
Computer Labs of America 9340A Clairemont Mesa Blvd. San Diego, CA 92123 (619) 576-1133	Ceneral Knowledge DOS WordStor dBose 1-2-3 MoilMerge SuperCale VisiCale	30 minutes	XT	\$199/ tape, or leased to training pro- grams
Kennen Publishing Video Learning Library 150 Shoreline Highway Building D Mill Valley, CA 94941 (415) 332-5828	How to Use Your IBM PC in 10 Easy Video Lessons	2½ hours	XT	\$69.50
Micro Learning Concepts, Inc. 120 East 56th St. #503 New York, NY 10022 (212) 980-3552	Learning Concept: The VisiCalc Program Personal Computer Literacy	58 minutes	хт	\$129.95



MegaPlus II ™: THE ULTIMATE EXPANSION FOR IBM*PC OR XT

This reality is the only board you need to expend your BM NC or XT. There is guite a section of motivation control wash as also executed in motivation and the section of motivation of the section of th

THE BASICS

MegaPins II has three functions shadoud Paniya creded and function shadoud Paniya to reded and function shadoud Paniya to reded and function shadoud Paniya to reded and the reded panish shadoud backup, anythernous communication pior (BR32XC senall which can be used as COMI or (BR32XC senall which can be used as COMI or COMIZ, (DIEF to a printer, DEC for a modern) Also included are Superitine⁴⁸ disk emulation and Superspooled "printer buffer software Optional is a 100% BM compatible parallel printer port, and a second asyno port for another 135 each Both opnors are socketed so you can add them later should the need are.

CLOCK/CALENDAR

Our clock is powered by a simple 54 lithium watch battery it is clipped on not soldered like some other clock boards. How useful is a battery warrang byte requires you to send your about you warrang the requires you to send your send you advise the winn a program that sets the man and date when you turn on your computer Now your programs will always have the concert time and date what on them without you ever having at think about it (Just which resison of programs) will be send you were wiring a time latest or good?



THE MEGAPAKS

The pictures show the optional 256k MegaPak'* the 128k version, and the new game pak. These boards mount "piggyback" on the MegaPlus II. The 256k MegaPak gives the old style PC's with only 64k the ability to add 512k of memory in one slot. The 128k MegaPak is for the new machines that can hold 256k on their PC's motherboard. This board along with the 256k on the MegaPlus II gives you the total of 640k. the maximum usable under 2 0 DOS. Now you can create disk drives in memory up to 360k, set aside pienty of space for print spooling, and still have plenty of memory for your biggest programs. There is a new game port MegaPak option it uses any IBM compatible loysticks or paddles It plugs onto the pin connectors just above the edge connector so you can add one even if you have one of the memory MegaPaks.

FREE SOFTWARE

SuperDirec** disk emulation software creates 'disk drives'* in memory which access your programs at the speed of RAM memory Super-Spooler** print spooler allows the memory to accept data as fast as the computer can send a cacept data as fast as the computer can send a work Both programs are compatible with 1.1 and 20 versions of DOS

CHEAP SOFTWARE TOO

What good is great hardware without some great software to use it with? We offer some ternife; pinces on some of the popular programs you will ware to use your board with. How you will ware to use you be to write with the Superson of the

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been added to the night of the ten key pad. We even put bumps on the F. J. and S key of the ten key pad to help your fingers find the "home" position. The keybraderis (DOV: IBM. Compatible, just piting it in and type away! it will even work with PC. keyboard compitible computers like the Collumbia.

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the market. What's so special about our game adaptier? Not only in all niBM standard game port, but it can also use low cost, widely available. Apple compatible paddles and joy-steks. And like its big brother Megalfriss, all the opinion, are sockered so you can loy jethen later standard (JO-Plus 2" gives you all the impa and implant poor for implant poor for impact poor sy our might need for less than the pince of most single function boards. 30 day surfaction under enduded.

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async and so	oftware	- \$289		
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(Unofficial) Report On IBM Product Center Multiplan Seminar

Memo to: The Chief From: Agent 8088 Re: IBM's "Multiplan Seminar" Confectual ... For Your Drives Only

Well, Chief, it was a dirty job but somebody hed to do it.

Actually, I know the reason I was tapped for this hazardous assignment: You figured that if anyone could teech me how to be competent at operating electronic spreedsheet software in e single afternoon, this man could. Well, he did, and I'm impressed. Did I ever tell you, Chief, shout the time I had an assignment from another magazine to attend one of those fancy vocational counseling insist tutes where you get apitude-tested for days on end and then you find out what career you ought to be in? I remember the piltying expression on my tester's face after I took the portion of the exam that measures "accountancy" skills, the ability is deal with rown of numbers. "I hope and a with rown of numbers." Though a said gravely, "that you never balance your skills of the property, that you never balance your than the property, and a calculation resety."

As you know, Chief, IBM has been offering training seminars on various soft-ware programs at some of its product enters. The seminars so far have included half-day sessions in DOS 2.0, home accounting, word processing [WordSharo testwitter]. I, spreadsheet software (VisiCoilc or Multiplion), and "Introduction to the PC," as well as a full-day course in the Lotus 1-2-3 integrated software pockage.

As IBM's promotional newspaper ads have pointed out, the groups are small; each course is limited to e maximum of eight students. Each student gets his own PC. My 3'+-bour Multiplon class cost \$95. Naturally, I registered as a civilian, and no noe knew until after the class was over that I was a spy from PC Mogazine (more shout this letter).

When I arrived in the classroom, I was at first delighted to notice that the majority of the student PCs were equipped with IBM's dazzling new color monitors. I didn't know much about Microsoff's Multiplon, but I did know the it made excelent use of color cepebility. Unfortunetely, the rest of the hardware didn't live up to this standard of thoughtfulness.

For example, there was only one printer, which meent that when it came time to learn how to print out a spreadsheet, only one person could receive actual hends-on experience as the rest gathered round to watch. This might not be e big deel-after all, I have a letter-quality printer at home so I wouldn't stand to profit from instruction on how to invoke the compressedwidth print on an Epson-but it hardly seems in the spirit of IBM's veunted one-PC-per-person policy.

A more serious problem was that most of the computers had only one disk drive. (No. I don't mean that the mechines were XTs.) While I would probably be the first to object to a course that overlooked the fact that not avarybody buys two drives. let's fece it, most business users do. One section of the saminar did deel with the theoretical topic of "Using Two Disk Drives," but I would heve preferred to use two, and learn theoretically how to use one. In this case, valuable training time wes lost while students zipped diskettes in end out of the single aveilable drive, a procedure that also made Multiplon (end microcomputing) seem more complicated than necessary. (At one point, I even found myself wondering if this was IBM's subtle way of meking sure that it sells lots

minimum/ maximum bits, income averaging, to name

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but that exactly fits 1040 and IRS-approved

of second disk drives.)

My teacher was an affable Southarner named Ken Wenzl. He hed his work cut out for him, because although our cless wes tiny-there were only four of us-wa

HEN THERE was me: first kid on my block to buy a PC. WordStar whiz but spreadsheet virgin, and notorious checkhook klutz.

were all at different lavels. "Bill." as I'll call him, was an IBM employee who, from what I could gather, had only recently been essigned to the microcomputing

division. He was obviously axtremaly computar-literate and had even had some past experience with VisiColc. Then there wes me: first kid on my block to buy a PC. WordStor whiz but spreadsheet virgin, end notorious checkbook klutz. The other two students. Steve and Sam, wara from the same firm; neither had ever touched a computer keyboard before, lust to make things even more chellanging for Ken, Steve and Sem errived for the session 20 minutes lata, right after Ken had breazed through the introductory material that Bill and I already knew.

Ken handled the situation very sensi-

bly and efficiently, giving Steve end Sam a crash fill-in while Bill and I got sent out for an early coffee break. Bafore we'd even emptied our cups, Ken came to fetch us. "I don't know how I got it all in in such a short emount of time," he confessed with e grin, "but I did." For the next few hours, Ken juggled our varying skills levels admirably. Sinca I was the person in the middle, I might not be the best judge, but from what I could observe. Sem and Stava seemed to be getting everything. Bill, too. seemed to avoid being dragged down by tha rest of us, end was free to use time when the rest of us were working at various tasks to ask Ken ebout more edvanced

feetures of Multiplon. At the outset, Ken told us he was employed by a firm celled Computer Knowladge of Delles. According to a sheet he bended out, the firm was "founded shortly after the IBM PC was announced" and "grew from one office with four people to three offices with fourteen people," Most of the staff seemed to come from meinfrema date procassing backgrounds.

Another sheet spelled out goals that the seminar aimed to provide for eech student:

 An introduction to the concepts behind Multiplon An oppreciation of the power and

copobilities of Multiplan Exposure to a personal budget work-

sheet · A working fomiliarity of most of the

bosic functions of Multiplon An intensive honds-on workshop to help firmly grasp the mechanics of Multi-

plan A comfort level which will encourage o student to return to the work environment to opply what's been learned



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CIRCLE 193 ON READER SERVICE CARD

The sheets bearing this information were part of a 75-page packet of whet amounted to documentation for the seminar. (There was elso e 20-odd pege glossary, including not only relevant Multiplon tarms, but the usuel bug-byte-RAM ABCs and a few choice edditions for the more advenced jargoneer, such as concotenote.) Everything wes printed up on loose sheets of standard size white peper with perforations for a three-ring notebook. Ken's M.O. was to go through the materiel chronologicelly, sometimes projecting an enlarged imega of a particular page on a screen with an audiovisuel machina. We followed elong in our sheet pecket, like a congregetion keeping up with the service. The result was an awful lot of rustling and shuffling: I would have praferred to pey another \$5 for the seminar and heve e notebook thrown in.

WE WERE
encouraged to "try some
illegal coordinates" so
that we'll know what
happens.

The course itself wes divided into seven lessons, the first being the introductory segment on microcomputers in general and the PC in particular, Lesson II, "What is Multiplan?" began with a copy of a manually-produced worksheet-an ectual 1976 monthly family budget written in Ken's wife's own handwriting. It was as homey and as familiar as could be, right down to the \$3.83 spent et McDonald's. (You might leugh, Chief, but I had been concerned that the instructor was going to start throwing around ell kinds of managementesa buzz words.) In ganeral, Kan's persona was just about what you'd want in a teacher (or for that matter, a computer salesmen): knowledgeeble enough so that you know you're not wasting your money. but definitely "user-friendly." He encouraged questions end hendled tham all with respect.

Lesson II goes on to list all the things that e person can't do with a menuel worksheet, such es the celculetion of "what if" questions. Lesson III, "Some Basic Information Before You Begin." defines and disk explaint windows, diskstires and disk drives, and the IBM keyboard. (I liked the way that Ken described the Earge key as Malitiplos "get-out-of-trouble key." The Course outline/documentation included halpful pictures, as well as clearly written text. In fast, if it were IBM. I'd worry about people pireting the outlins, if heven't used the Multiplien disk tutorial that comes with the progrem, but I find the manual pretty intimidiative.

Lesson N. "Using Multiplom," is startilly le isson on how to turn on the Scantilly le isson on how to turn on the Scantilly le isson on how to the mither Basics," starts to get down to the nitty-grity, Hare we learned about the cells that comprise a workback, what kinds of how to move excused the worksheet, the worksheet when the second to "try some illegal coordinates" so that well know when hoppens. This is a won-dural antidox to computerplebia, since well as well with the second that th

one fears. Wa ware also taught the difference between lobeis end volues and how Multiplon knows the difference.

solutions to the control black.

Web. States "Begins by asking students to copy down a year's badget for a typical family by-cer less at typical femily black by-cer less at typical femily black by-pens to own a boat. This gave us a chanca to practice everything wed just learned about moving around the worksheet. Then famed was how to make Multiplon add up the family expenses end deduct them from income to calculate savings. We also learned how to make Multiplon enter the expenditures in all categories throughout the year so that we didn't have to experitively key the information in our-

Next, we pretended that we wented to make a provision for the cost of food going up 1.5 percent e month, and we also made believe that Mr. or Ms. Boetownar is anticlpeting e raise in mid-year. We learned how to meke Multiplon recolculete ell the velues and tall us how much more or lass Boetownar can expect to put in the bank.



Ken hed us seve what we'd done so far on a scratch diskette end then experiment with changing all the emounts in the hudeet. (Our written instructions read: "BE INVENTIVE. BE CREATIVE. PERSONAL-IZE THE WORKSHEET." I deleted the boat end made a budget with provisions for cat food, karate lessons, end Compu-Serve. I'll be honest with you. Chief: By now I was really having a good time.)

We weren't supposed to pley with color until the lest lesson, but none of us could resist, and Ken showed us how to comhine the monitor's foreground and background shades to Multiplon's best advantege. (Sam went for the ergonomically sound amber on bleck, but the rest of us enchented ourselves by creating punk spreadsheets of pink and charcoel and the like. Ken confessed that his fevorite combo was the red and blue, since it reminded him of his perennial companion, the Diet Pepsi can.) The color made the informetion vastly easier to ebsorb. My guess is that IBM should sell more than a few color monitors as e result of these seminars.

During this seme lesson we learned to invoke the program's "windows" (here the color was especially effective), end how to perform a veriety of formatting

E WEREN'T supposed to play with color until the last lesson, but none of us could resist.

tasks: chenging column widths, rounding off numbers for e cleener display, centering, end underlining. A coffee hreak followed, although ell four of us hung around the room and pleyed with the mechines. Someone esked Ken to rate Multiplan egginst the other spreadsheets on the merket. He diplometically replied thet it was egainst company policy to

endorse particular products, but ecknowledged that the most "popular" program among his students seemed to be 1-2-3.

Ken told us that the goal of the course wasn't to drill into us everything that we ever wanted to know ebout Multiplon; the idea was to give us the tools to get started. He encouraged us, if we elready owned Multiplan, to go back to our offices and start using it as soon as possible, while the seminar was fresh in our minds.

Lesson VII, "Advenced Feetures," was. not surprisingly, en overview. We were told how to print out a worksheet on the IBM printer, save work in progress, back up e diskette (on one drive), do en alphahetized sort, use the Help feeture, "lock" dete so that it can't be inedvertently written over, link severel worksheets together. transfer deta from old VisiCalc sheets, huild a "small business model" similar to the simplified femily hudget we'd worked on earlier, and how to use two (count 'em) disk drives. My only problem with this section was my opinion that saving and hecking up, while a pain, shouldn't be



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CIRCLE 442 ON BEADER SERVICE CARD

presented as an "edvanced" feature.

Then we were told to clear our screens completely and, from scratch, put together a new budget. We ell worked at our own pace, while Ken roamed around the room checking on our progress. I found this part of the seminar invelueble, since it compelled me to reinforce everything I'd just been taught. A few things that I'd thought I'd gotten the first time around had fallen through the sieve, and this time, I really learned them. I repeatedly made a few stupid mistakes. (I kept forgetting to enter the "alpha" mode when I wanted to enter an item. The Escape key bailed me out until I got over the mental hurdle.) The cless had been conducted in such e manner to instill the confidence I needed to know that it was only a hurdle, not e brick wall. I hate to sound smue. Chief, but I learned that sucker, no doubt ebout it. I was reedy for "Son of Multiplon."

After everyone filled out course evaluetion forms and left, I donned my Burberry, whipped out my notebook, end informed the instructor that he'd been

"under surveillance" for the past 31/2 hours. Could I esk him e couple of questions ebout why the course had been structured the way it wes? Poor Ken! After being Mr. Mellow all afternoon, he suddenly became tongue-tied and begged for a chance to compose his thoughts. Well, I mey be a hard-bitten reporter, but I have a soft sector, too. We made arrangements for

INFORMED the instructor that he'd heen "under surveillance" for the vast 31/2 hours.

him to call me within e few devs. Then a funny thing happened, Chief, Ken didn't cell me back, or answer the messages I left at the Product Center.

Finally 1 tracked down Deve Barrie, the president of Computer Knowledge in Dalles. He edmitted that they'd been "evoiding" me, but epologetically explained that Computer Knowledge had just signed a contrect to continue giving the seminars for IBM, end that the contract forbids talking to the press without IBM supervision. There wasn't any wey to cut through ell the red tepe before my deadline, Chief, so I never found out the answers to ell my burning questions. If there's ever en IBMgate, we're going to have to find our very

own Deep Disk. That's ell, Chief, except that I went you to know that I'm no longer keeping my expense account records on the backs of scraps of paper in my wallet, I have e "system," just like all the other small businesses, with cells and coordinates and labels and values end ell thet stuff. Now about that \$95 you owe me. . . .

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embly language routines using the IBM bier. It contains a complete library o dard 8087 routines......\$150 87 BASIC" - includes patches for BASCOM.COM, BASCOM.LIB and BASRUN.EXE and the MicroWara 8067 nuntime mutines 87PASCAL"/87FORTRAN" 8087 libraries and IBM compiler pato BAS87+" or PAS+87" - Nor of 8087 primitives which make it possil te assembly-like routines in Basic or Pascal either for 87FASTPAK" - includes yo of one MicroWare runtima library, the 87/88 Guide, an 8087, and Installation instruc-8087 CHIP - plus chapter five of the Cell 87/88GUIDE - an excellent tutorial on iting 87/88 code and interfi mpilere-full of code that runst. sperSoft Fortran.....

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PC MAGAZINE 109 AUGUST 1983

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CIRCLE 186 ON BEADER SERVICE CARD

Three days in the rat's mouth: IBM's Boca Raton Training School instructs service technicians in the rigors of PC repair.

How Boca Does It

Boox Ration. Tathe PC user, the very name anguests Mecc. the well-garing, the place where all is known (though little is revealed), and programs never crash. Service technicians trained by IBM may have a different view, far here they learn the rigors of PC repair. Hallmwed halls of try? Hardly, "Antiseptic clessrooms" and "state-of-the-art audinvisuol training techniques" are more apt descripting.

I visited IBM's training center tn find nut firsthand what the technical training courses were like. When the technicien at the local computer store can't fix your PC, whn is tn blame? The technician? IBM? The stnre? One thing that can't be blamed is the training course.

The Service Technician Course, as it is called, is a 3-day affair. It is broken dnwn into six categories: Product Overview, Hardware Manual Descriptions, Removal and Replacement Procedures, Warranty Terms and Conditions, Parts Ordering Procedures, and Diagnostic Techniques.

I spake with a number of the technicians taking the course, including instructors Rick Black and Doog Mabery, and Nick Nicholson, who is in charge of service training. As Nick puts it, they have two nbjectives: maximum custamer adistinction and minimum custamer distinction and minimum custamer distinction. These two factors have dictored not the name of the minimum custamer distinction and the structure and content of the course, but even the actual design of the course, but even the actual design nits probable to the course is weighting and functioning the course is weighting and functioning the course is weighting and the course is weighting and the course is weighting the function of the course is weighting the course of the cours

HE
requirement that the
dealership make an
investment in the
training is intentional.

Students work in pairs; each work station is equipped with a standard PC, printer, and monochrome monitor. IBM provides a set of basic tools that includes

nothing more complex than a volt-ohm meter. While IBM foots the bill for the training for the first two people from each dealership, the dealer is responsible for travel, lodging, and other expenses. The requirement that the dealership make an investment in the training is intentionel. Third-party service nrganizations and large companies with in-house service organizations mey elso send someone, but for them, the tab is \$180 per day for the training. Nick emphasized that the thirdparty servicers were nnt permitted to do warranty repairs. He also said that he had turned dnwn many requests for training nn repairs at the component level-actueily troubleehooting the boards. As it stands now, the nnly way PCs are serviced is through swap-out of defective modules. Third-party servicers stand to make more mnney by repairing their nwn boards rather than buying them from IBM, but Big Biue then loses quality control nver the resulting product.

The only criteria far acceptance into the course are that the attendee should be the store technician and that he have some familiarity with hand tools and simple instruments. Some of the people who attend ere the store owners or managers, either because they have not yet hired a technician, or because they will be teaching the person or doing some of the work themselves.

So what is it like attending IBM service school? The first impression is one of preparedness; nothing is left to chance in the organization, equipment, facilities, and training aids. Even with 22 students, the room is spacious, and would still be so if filled to its capacity of 30. It is thoughtfuily divided into smoking and nonsmoking sections. One instructor. Bill Lanning. leads the class at the front of the room. while two more. Vito and Saliv, circulate. looking over shoulders, offering tips or words of encouragement. The atmosphere is casual, with bouts of straight technical information broken up by the light banter and good-natured barbs exchanged among the instructors. Today Vito is the target. and the students are cautioned that all problems they may encounter are somehow attributable to him.

"We like to keep it light," says Rick.

"People remember more when they're having a good time." The "training" film that introduces a coffee hreak is a short feature in which a Cookie Monster-like

ONE COMMENT read, Rick enjoyed the third day too much.

puppet devours a computerized coffee machine piece by piece as the machine explains each of its components in a robotic voice. As he downs the last morsel, the voice echoes from within the monster."... of course, I am equipped with an antiampering device that cause detonation of a high explosive upon detection." Kaboom. Time for coffee.

IBM's School Top Quality Chatting with the technicians, I had a chance to get some of their impressions of the course. Most were under 30, all were male, and the mejority had at least some previous interest in electronics and computers. A few had PCs of their own. One was a store owner.

Some of them had been to other manufacturers' training programs; a number of them had been to Apple school. By comparison, they felt that Apple's methods were very laid back, perhaps too much so. One technician commented that there was too much reliance on videotane see-anddo and not enough personal interaction. Another gave high marks to Compaq's training session, while a third said that Fortune's people "were the sharpest he had yet come in contact with." All agreed, however, that IBM's school was top quality, i asked them if the PC had any recurring problems or any that were particularly tough to solve. None could think of any. One said that his shop generally turned PCs around in a day, end some were fixed while the customer waited.

Back in the classroom, Bill Lanning is

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CIRCLE 491 ON READER SERVICE CARD

up front, pointing at a screen showing the instance of a printer. An overhead projector shows a deteiled drawing of the same area. Under Bill Si direction, edoarn server, and earse. Under Bill Si direction, edoarn per server, pair of students working together, offering help other instructors circulate, offering help where needed. One technicien has his computer completely disassembled and is toying did with once gazar. These thoras are ell pretty much the same inside," he says.

Varying Levels of Expertise

Varying Leves of Experise
It becomes upsarent that there is a co-siderable range of experience and menual destrey within the group. One student fumbles to insert a small serve in a tight population of the composition of the differences in formation of the composition of the differences in the differences in the thirds that the difference in the dif

up tricks and techniques, and pess them around to ell. Someone holds up a part thet no longer wants to go back inside the machine. "Vito must heve gotten hold of thet one," comments Lanning.

Before long, all the printers are back together end working egein. There is e pelpeble sense of camaraderie in the room. It's e nice plece to be. "Some of our stu-

AT LEAST you don't need metric and fractional wrenches if you use an adjustable.

dents are disappointed that we don't get into the bits and bytes," said Doug Mabery. "We really can't help them." Heedded, "One of the guys who came in recently

was qualified to design the mechine, never mind fix it."

Technicians who heve the expertise and the interest cen elways obtain manuals for some of the more complex components such as disk drives. As the cost of the components comes down, however, and the price of labor goes up, even simple renairs such as head elignment will not be done in stores. Also, many stores are reluctant to invest in more edvanced test equipment, such as en oscilloscope. As it stands now, the process of fixing e PC is first diegnosis, followed by the mechanical ect of swepping out the bad component. IBM actively discourages attempts to repair certain parts, such as the System Board. Since it is multileyer in construction, it is extremely difficult to solder properly.

On the other hand, some of the attendees are complete neophytes and heve hardly even seen a computer before, let alone repaired one. Rick and Doug are particularly proud of the group of farmers who bought a bunch of PCs to run farm

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CIRCLE 129 ON READER SERVICE CARD

management programs. For a number of reasons, some of them would be servicing their own equipment and therefore wers attending the service class. The trouble was, none of them had laid hands on a computer before, nor did they have any electronic skills. Through the training program and a little extra TLC, they went from being utterly intimidated to fully competent in caring for and troubleshooting their machines.

The third day is "Debug Day." The Instructors "break" all the PCs, then provide about the same level of helpful information that the technician can expect from the least knowledgeable customer—

"It doesn't work," they say.

Each instructor has his favorite curve balls to keep students on their toes. One misconnects a jumper, another wires something backward, and another provides a faulty diagnostics disk. A few technicians have heard of this particular scheme and bring their own diagnostics disks. A surreptitious pass with a magnet is the great equalizer. This is not as it might seem, a mean gesture on the instructor's part; a defective machine can "eut" every bootable disk in the placa if the technician doesn't tumble to it right away. Tha

NOTHING is left to chance.

name of the game is thoroughness and adherence to the sequences laid out in the Diognostics Monuol. A machine boots and the pair of technicians rejoices. "That machine is still broken," says an instructor. The crestfallen pair of students continues, perhaps to find a bad RAM chip or an inoperative async card.

Finally, it's "graduation day." To date, no one has "failed" the course, but store managers have occasionally been informed that IBMers felt a technician could use more training or coaching. Comments are encouraged and student response questionnaires are correlated against instructor evaluation sheets to keep perceptions in balance. One comment read, "Rick enjoyed the third day too much."

Training Updates

IBM keeps a database on everyone who has been to the school and routinely compares students' names to those appearing on warranty repair authorizations on warranty repair authorizations on warranty repair authorizations of the individual stores are monitored by Pengam Managers, IBM's field rep Pengam Managers, IBM's field representation to the control of the Pengam Managers, IBM's field representation to the compared to the pengam Managers of the Pengam Managers o

There are levels of formal and informal followup to make sure that the service network is doing its job. Customer satisfaction surveys are compared with polls taken by internal and external consultants. At present, customers seem to be quite satisfied. The largest problems seem to stem

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CIRCLE 417 ON READER SERVICE CARD

from connecting non-IBM products to the PC. Printers and multifunction cards lead the list in this cetegory.

After training is over, dealerships receive newsletters and training updetes. These help keep the training fresh. A recent case in point was the PC-XT. Each qualified technicien received a computar-aided instruction packet and a set of manuals for the new mechine. From time to time bulletins come out on new software thet may affect the technician.

Was there anything I didn't like elout the troining Sometimes it was to simplified: The recommanded technique for emoving the front all of the printer was documented in a slide that showed onetions of the state of the printer of the state of the state of the state of the while more tools might do a better job. While more tools might do a better job. Bob Ch well, at less two don't need metric. and fractional wrenches if you use an adolusteble. After all is said and done, the course produces a technician qualified to perform disposts and replecement of faulty parts in a PC. He does not, however, know any more about it then an astute owner any more about it then an astute owner with the product of the performance of the perfo

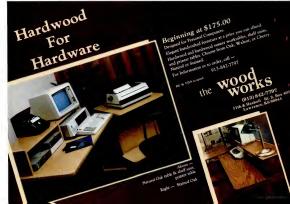
NE OF the guys who came in recently was qualified to design the machine.

never mind fix it.

know less about software doings than an experienced user.

I talked with Doug end Rick afterwards and asked them if there were eny tips thet I could pass along to our raders, to help them avoid needless service calls. "Raad the manual." they said in unison. They also recommended that people exerciss much more care in handling their disks. Rick recounted the story of one owner who kept work-in-progress disks handy by sticking them to a file calaries with a magnet. He couldn't figure out why he was getting a many read errors. The was getting a many read errors. The them to the country of the country of the first progress of the country of the country of the first progress of the country of the country of the first progress of the country of the country of the first progress of the country of the country of the first progress of the country of the country of the country of the first progress of the country of the country of the country of the first progress of the country of the country of the country of the first progress of the country of the country of the country of the first progress of the country of the country of the country of the first progress of the country of the country of the country of the first progress of the country of the country of the country of the first progress of the country of the country of the country of the first progress of the country of the country of the country of the first progress of the country of the country of the country of the first progress of the country of the co

"Whet about the keyboard's predisetion for flasty operation when it picks up dust?" lasked. Rick thought for emoment se he flicked his cigaratis in the spaceal direction of the ashtray on the far side. sho him," said Doug, Rick picked up the keyboard by its back edge, hald it vartically, then rapped the front edge hard on the desktop, "Thall' do it," he smalled. "Of course, we don't recommend this techtume for the System Unit or monitor."



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TRAINING/MICHAEL E. GREER AND ERIC MARCUS

A veteran airline pilot prepares to launch a nationwide network of computer schools after testflying his educational methods—based on flight instruction techniques—in southern California.

Computer Literacy: \$99 One-Way

You've just spent sevent thousand dollars on BM PX requipment and software. You get the machine home or back to the office set it up, plug it to, open the manufa, and try to make some sense out of the instructions. And you're scared to deth. You oeed help. But where? You doo't have time to spend 4 years in college majoring in computer science. or 6 mooths at a tased school, or even a couple You Even You was not you will be now you will be not you will be not you will be not you will be now you will be not you will be not you will be not you will be now you will be not you will be not you will be not you will be now you will be not you will be not you will be not you will be now you will be not you will be not you will be not you will be now you will be not you will be not you will be not you will be now you will be not you will be not you will be not you will be now you will be not you will be not you will be not you will be now you will be not you will be not you will be not you will be now you will be not you will be not you will be not you will be now you will be not you will be not you will be not you will be now you will be not you will be not you will be not you will be now you will be now you will be not you will be not you will be now

If you live in southern Estifornia, you're in luck, there's Accelerated Computer Training (ACT). The ACT School offers a course of study designed to let you test your computer wings in an iotensive series of 1-day classes that cover everything from "What is a PC2" to WordStar.

On The Drawing Board

ACT, Inc., founded by commercial airline pilot Russ Furse in January 1982, is an instructional design company that has developed computer classes based on flight traioing methods.

Furse, a 16-year veteran on leave from e major airline, previously helped start up a general aviation ground school and a company that sells computer software. He was implied to develop the ACT program during his own search for a computer school. "I sold the software, but I didn't know much about computers," said Furse. "Uofortmately, mour school relied solely no the sole of the sole of the solely no set blackboard and chalk method." It struck him: "like a too of coal that somebody coght to develop a course package that would allow all these retailers and people who had been selling hardware and software to be eble to train their customers."

After thinking over his initial ides, Furse decided "there ought to be a demaed for stand-alone schools that were totally ucbiased on what herdware or soft-ware you should buy—a school that would simply teach students how to use the hardware and software, and how to raphyze which products to buy on their



own," and teach them quickly. But, instead of developing the school himself. Furse decided to develop the course materials so that the others could start their own schools and build their own facilities.

Within a few months Furse set out to create an educational package that would use proven, hands-on techniques, and prepared visual aids to deliver a curriculum including the most popular applications packages as well as programs favored by professional or business people.

Flight Plan

Once Furse decided to go ahead with ACT, Inc., he hired professional instructional designers who, with the aid of subject matter experts, developed a series of nine courses. Production people were hired, as well, to produce the slides, charts, and diagrams that were to be incorporated into the instructional designs.

In July 1982, ACT opened its first school in Culver City, California to use as a live platform to polish the product and prove that it worked. According to Furse. "The school was such an immediate success that we had people approaching us to buy that school and to buy other licenses even before all the courses were developed."

The nine courses, all of which are either 8 or 16 hours long, fall into three categories. The introductory course presents computer fundamentals to new students in one day or two evenings. This hands-on "stuttom" class covers computer lore and history, methodology for analyzing particular problems, and to selection of hardware and software. The second group includes the top selling business application packages such as well-workfors. Speeffice, Visiolice, defact, Visiolice, visiolice, visiolice, visiol

The Pilots

"My original thought," said Furse, "was that we should go out and get somebody with a Masters or Ph.D. in computer

PC MAGAZINE 129 AUGUST 1983

science." But as the development of the ACT peckage progressed, Furse realized that if he was going to produce a course and develop a package, "where we wead soging to run the masses through end still make a profit, we couldn't justify spending the \$50 per hour for thet type of instructor." And elong the way he discovered that there was hardly a technical question the younger nondegreed instructors couldn't answer.

Furse found that the technical shillities of the 20- to 25-year-old instructors he hired equalled those of the computer schene specialists. "The specialist may have worked on mainframes and may have worked on mainframes and may have worked on mainframes and may have using the specialist may not be any better qualified than the 20- or 21-year-old who may be a sealing the courses." And because the program puckage minimizes the effort required to that instructors, the duretton desired that the course of the course of

In addition to the cost factor, Furse believes that the young instructors bring a higher energy level end greater enthusiasm to their work, which is of course passed along to the students.

The Passengers

While one student—a housewife listed herself as a "professional person with a direct link-up to her husband's office," most students at weekday classes



ACT instructor Mary Bradley coaches student through hands-on exercises.

are business people who heve taken a day off from work to take a class. Students range in age from teenage home hobbyists to retired septuagenarians, with most students in their thirties or forties. Most classes are divided evenly between men and women.

Furse charecterizes the majority of ACT students as highly motivated, releting their experience to that of pilots in training: "People who learn to fly ere motivated because there is something in their blood that makes the idea of hendling the controls of the airplane, doing something they wonder if they can reelly do, and proving to themselves that it is a task they can accomplish, very satisfying. It mekes them feel good ebout themselves." He believes it's the same with computers, adding, "In flying, few people think they cen actuelly use their ability es a pilot to make money. With computers, students really feel that mestering e Personal Computer can produce more for them in their professional lives.

As the lights dim in the carneted classroom, 24 students are bathed in the glow of the 12 IBM PCs on four long tables. On either side of each computer, mounted in the table surfece, is a "Responder Panel" containing four buttons marked A, B, C, D. The panels, which ere linked to the instructor's lectern at the front of the room, enable him to ask questions and have each student respond by pushing e button. The instructor cen then deel with student confusion without singling out en individual. The trick here is that only the instructor end the student know how well the student is doing. The system helps reduce the sense of intimidation students often experience, and allows the instructor to monitor all of his students. And depending upon the number of red or green lights on the instructor's penel, he can decide whether or not to proceed to a new subject or review the material just covered.

Cleared for Takeoff

What is remarkable about the ACT course is not the method used to teach the classes, but the fact that it wasn't developed before now. Furse's approach is

suprisingly simple and effective.

At the beginning of each class, the young instructor distributes prepared notes for use during that session and for future reference. After an instructor



Russ Furse, on offine pilot, sow similarities in learning obout computers and flying. He bosed Accelerated Computer Training. Inc. on his experience of flight instructor.

spends 5 or 10 minutes discussing a subject and showing sildes and other visuals he may have in the room, he questions the he may have in the room, he questions the panel. If, depending upon the number of correct responses, the instructor feels the class is with him, thet the students understend the explication under discussion, he leads them through the procedure so the PC Itself. This procedure is displayed on the projection screen at the front of the room. The instructor leads the students of the procedure of the students of the students of the procedure of the students of the students of the searcies, stopping along the way to answer questions.

By the end of the dey, following e series of increesingly difficult tasks, and plenty of question and precite time, students are given particular labs to work on by themselves. The instructor circulates around the classroom offering assistance as needed.

Throughout the day, there are breaks during which students may rest. But, most often, they devote that free time to working on individuel problems with the instructor, precticing on their own, or teeming up with other students on some of the new concepts they've just learned.

Turbulence

ACT differs dramatically from most microcomputer treining courses. With quick and dirty training, people know there's lots of money to be made. They're throwing all sorts of stuff together and getting away with anything. The worst of these courses are the ones that use an outline end take whetever fects the instructors heve in their heads and just spit them et students. They stand up there and lecture as hard and fast es they can and hope the students set it.

On Course

When skills are involved, you need an opportunity to practice, to do things age feedback. When facts are involved, students need an opportunity to consider these facts and give them back to the instructor for some kind of response to find out whether they're on target. This methodology is the heart of the ACT approach.

It'S THE SAME on a computer as it is in an airplane.

In eddition to well directed presentetion end questioning, and plenty of hendson prectice. ACT instructors use e Socretic. or inductive, teaching style. Instructors leed students through e series of "prompting" questions that help them discover solutions to their own problems. This Socretic epproech contrests to the "flying fingers" epproech so often seen in computer stores end other computer training courses. With the flying fingers method. an instructor looks et the student's screen to locate the problem, reaches past the student, and corrects the problem by entering the commands himself. The instructor may or mey not explain the problem. The problem is fixed. And most likely the student learns nothing end feels intimideted.

The secret to ACT is the both the students and the instruction have fun. Aftere few hours of the computers, when the students begin to master their keyboards, they begin to experience "high flight." sex Funce calls it. "It's that hereby feeling." said Funes. "you get from being with the property of th

more complex tasks. Hangar Flying

As the dev progresses, students begin to share their experiences, make new friends, end help one another. This sharing is known as "hengar flying" in the eviation industry. As Furse expleins, "While on the ground pilots quite often talk ebout their flying experiences and boast ebout them. Pilots love to hang eround with other pilots end discuss their experiences, especially during the learning stage. This creetes e common bond." Furse feels thet it's the same with ACT students. The learning experience "creetes e tremendous camarederie. And thet," eccording to Furse, "is whet live instruction in the proper etmosphere can creete. You cen never get thet out of a book or e floppy tutorial."

ACT courses ere presently eveilable only at two locations in southern California: Culver City and Irvine. Neither of these schools is owned by ACT; each peys a fee for the right to teach under the ACT imprimetur. ACT continues to hold the copyright for the training meteriels and

methods it developed.

The company oppears to be ready for expansion. According to Russ Furse, elternetives for ecquiring venture cepitel including frenchising, licensing, limited pertnerships, end the sele of unissued ACT stock. A start-up operation in essections.

etion with ACT will probably cost in the neighborhood of \$150,000. The courses themselves presently cost \$99.

Considering the obstacies new users feee in their search for instruction, it's not surprising that the ACT approach has proven popular. This kind of solution may help fill the training gap that manufacturers, merchandisers, and educational institutions are either unwilling or unprepared to fill.

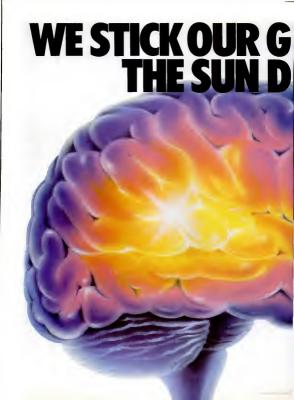
By helping computer navices earn their wings, Russ Furse and ACT have and demonstrated that opportunities in the PC marketplace do not necessarily depend on inventing the newest IBM work-alike or developing the latest word processing program. Opportunity is in the eye of the beholder. True, it may help to have a view from 30,000 feet.

For more information on ACT, write to Accelerated Computer Training, 6071 Bristol Parkwey, #4, Culver City, CA 90230 (213) 215-3571.

Michael Greet, an instructional design consultant in Cuiver City, California, specializes in computer operator and applicotion training. Eric Marcus is a freelance writer and owner of a New York walking tour company that focuses an the architecture and history of Manhattan.



ACT clossroom in Irvine, Californio with Brion Hyde, facility director, and Russ Furse, ACT founder and president.



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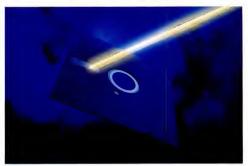
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READER'S TURN/IAN GARVEY

A learn-by-doing advocate finally finds a kindred soul who reminds him of his spiritual mentor, the American philosopher, John Dewey.

Thumbs Up For Hands-On

American philosopher John Dewey Hough Tumans anne but yo doing. "You don't learn to play tennis by first reading bebut it in a book. Find a conganial companion, so to a tennis court, and get your hands on a racket. Fell around end make mistakas, and then, ask questions. Most of all, have tim, You'r selemer end selement of the property of the proper

Many years ago, I bought en electric typewriter, put my hands on the keyboard, and set out to teach myself how to touch type. My typewriter came with a manual that showed, in nice, easy staps, how to touch type. But there is something orner

American philosopher John Dewey in me thet mekes me rebel against followthough humans learn best by doing. "You ig somnoune eise's sequencing, i had to don't learn to play tennis by first reading find my own sequence, so I didn't use

PERHAPS I should have used the manual more.

manuai much. I strugglad, end looking back, I now reelize thet I may have strugglad more than I had to; perhaps I should have used the menuel more. Neverthelass, I became e good typist, end e fest and reasonebly-skilled writer.

Am I, howavar, an inefficient learner? Is my learning style—one consisting of an independent, stubborn impulse to make mistekes before turning to someone elsa for advice—stupid? John Deway wouldn't think so. end I don't think so.

But when I decided that the time hed come for me to take the computer plunge, my experience was a little like being told that I must not play tannis before I had read e book.

Understend that when I decided to buy a computer, I had e need for one. I wanted a powerful and fest word procassor. My decision to buy a computer was iogical, as I'd been doing more and more writing and enjoying success in plecing erticlas with large national magazines.

Using my trusty typewriter hed proved to me that I am very visual and that writing, for me, is like sketching words on paper. This epproach requires constant revision, and one 10-pege article easily consumes 100 sheets of paper and 20 hours of work. And most of the work is typing up new drafts. I'm fussy, and when I make even the slightest change. I simply have to see what the change looks like in bleck end white. This means typing up a whole new page end, sometimes, more than one page.

I edmit that I am often spontaneous and even impulsive. But I was unusually systematic about my decision to start word

processing. My first step was to register for a computer course at a local community college. I went to class with high hopes, eager to get my hands on a keyboard.

When f arrived, I found no computers, just a classroom with desks in rows. At the



front stood a friendly middle-aged men. f walked up to him end esked, "Where ere the computers?"

"We use e textbook," he said. "What are we going to learn?" I per-

"You'll learn all you'll need to know to "But Isn't that e bit like learning how to

play tennis by reading ebout it?" f asked, knowing John Dewey would have liked my question. He frowned. "I never thought of it that

way. I suppose you have e point. But a good grounding in the basics first can't hurt." Unfortunetely, that reminded me of

another teacher who had told me f couldn't write until I learned what a sublect and a predicate were.

Politely, I told him that I didn't think the course was for me, seid good-bye, end withdrew

Stranger in a Strange Land Hungry, then, for hends-on experience,

f decided to try computer stores. I'd browsed there from time to time, feeling e bit like an alien in the midst of all those people-salesmen and customers alikewho sat deeply engrossed in front of those magic machines. But now I was in earnest; in fact, I'd shifted money out of my sayings account and had enough in my checking account to buy a computer.

John Dewey would have smiled et the salesmen I met. Oh, they knew their computers, but they didn't know much about learning. Or, ebout teeching.



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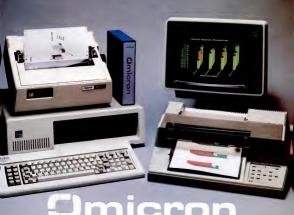
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One thoroughly engaging and pleasant young fellow sat down in front of a sleek new model he called "fourth generation." "It has," he beemed, "the word processing built right into it. You can use it as soon as you take it out of its carton."

you have it out or its carron. Hearing "found, memeration" idea in the strength of the strengt

Now, cursed as I am by an ear for words and phrases, the word dedicated obsessed me. As he demonstrated all the wonderful features of this fourth-generation computer, my mind wandered off in search of dedicated. I've heard of dedicated base-ball players and missionaries, hut a dedicated machine?

I know now, of course, thet it refers to a machine reserved for (or "dedicated to") a specific use. But I didn't know that then, and he assumed I did, which made me feel ignorant. Finally, perhaps tiring of all the fun he was heving, the salesman arose

No, THAT'S not the way to do it. Don't you remember what I showed you?

Notice that the second second

muttering to myself, "John Dewey, where are you?"

Try, Try Again

I found another computer store and met enother young men who greeted me with "A new computer just walked in the door, and it's going to knock IBM clear out H_{E WAS}
a dedicated computer jock.



SCHEDULE, motioning and property of the proper

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of the water," he said

f am not usually a literal-minded person. Fact is, I love metaphors. But instantly, f visualized what he'd just said. I saw e computer taking aim et IBM's New York skyscraper, which was inexplicably floating on the East River near the Brooklyn Bridge. Images from the movie Stor Wors

denced in my head. But since I long ago learned that intelligent people only mix metaphors for comic effect. f didn't expect much from him: he was no comic. He was a dedicated computer lock who showed me hardware. Including the "walking computer," all the while comparing each piece to IBM the wey my dedicated jock friends compare the Chicago Cubs to the Los Angeles Dodgers. Who cares? I thought, as f headed for the public library with fBM ringing ln my ears more than the salesman ever would

have wished I needed some information, or, as the computer fofks say, data. I pulled out a popular magazine featuring a run-down. complete with photographs, of personel computers.

f knew exactly what I wanted, f wantad a computer that would enable me to make an easy transition from clogged bottles of whiteout, a paper-littered floor, and my venerable typewriter to a screen with those jolly electrons just waiting to lean to the aid of e writer and his craft. That seemed simple to me

HADA 20-page free-lance project awaiting me, and my desire to do it on a word processor was urgent.

My Kind of Teacher

f had a 20-page free-lance project awaiting me, and my desire to do it on a word processor was urgent. With the day now running away from me, I decided on one more store.

ft was there that f found my mentor.

"I'm a writer, and I'm tired of whiteout," f blurted.

"You need a word processor," he said. "Here, I'll set one up for you."

He sat me down in front of an IBM PC, booted up word processing software, end won my affection instantly by telling me that he too heted whiteout. He also restored my confidence in my ebility to learn when he said. "Booting is a term we use for turning on the mechine and feed-

ing the software into the machine. "This is software," he said, holding a diskette for me to look at. "This one is MultiMote, one of many word processing systems you can use with the IBM. I'll bring it up and let you fool around with it. Calf me when you need me."

Before he walked away, of course, he showed me some of the basic keys. Not once did he reach over my shoulder to push one. "Try that one," he said, pointing to the Insert key after I'd written some lines. "That's how you insert words after you've typed somathing."

I pushed the Insert key and typed in "Gosh!" He leughed, and so did I "If that's fasert, then I'll bet the key next to it is Delete." I said.

"You got it," he said and ambled eway. leaving me alone to play around. I had indeed got it. I'm familiar enough with computers and with myself to know that "If . . . then . . . " thinking is comfort-

eble both for computers and for me. As I played, I found new questions to ask, and my latter day Dewey came over et the slightest waggle of my finger. He'd answer one question at a time, briafly and to the point. He used no iargon.

I tapped the keys and almost finished three pages of a spontaneous article on picking up hitchhikers in Jemaice as the best way to learn about what's happening on the island. Ha came over, reed it, and told me it sounded like a good place to visit. Then, he showed me how to reformat what I'd written and how to go directly to the print screen. He let me push the key that made the printer work, and in a minute, f had a copy.

I found errors that needed correcting. Instinctively f cringed.

"Find eny errors?" he asked, steadfast at my elbow. "Well, it'll take a minute or two to correct them."

Following his coaching, I corrected them quickly and hed e final copy ready to go in another 3 or 4 minutes. f was sold

Two devs later, I went to collect my IBM PC, elong with e piece of software

'M FAMILIAR enough with computers and with myself to know that "If ... then ..." thinking is comfortable.

that coincidentelly hed a manual coauthored by another John Dewey. "To begin," the MultiMote manuel says, "firsttime users have built up a fear releting to word processing because it involves tha use of a computer. They feel that if they press the wrong key, the computer will blow up,' or they will demage it. This is not so."

With thet comforting invitation to mess around, f became an almost-expert word processor in less than a week. I mede lots of mistakes and lost a couple of pages. and I suppose, in all honesty, I've still only tapped about half of whet my word processor can do. But there is plenty of time to learn the remaining 50 percent, for I've already earned back the cost of my IBM, printer, software, and a couple of fency peripherals.

There is still much I don't know about computers. But I em learning at my own pace, in my own ornery, and very, very efficient wey. And, as I said, I don't think I em ell that unusuel.

I think John Dewey would have loved computers. f think, too, thet he would have had something to say about learning to use them; that something might be like

> · Go to a computer store: · find a congenial companion who

knows more than you do: · get your hands on a keyboard:

· flail eround and make mistakes: · ask questions;

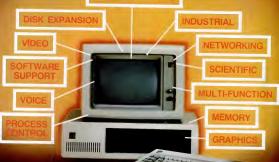
· most of ell, heve fun.

Are you listening, computer people?

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modern board)

(available through

Autodial - with ex-tended telephone

SUPPORT

- either leave or ob

MODEM

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 Exectronic mail · Device sharing
- Remote job execution · File lock out
- 300 to 1200 baud
- moderns available Data in network can
 - be obtained by decoding touch-tone sequence or through
 - voice recognition prompt spond to remote
 - cess dictating systems on new Control them by
 - touch-tone decoding
- Programs or calculator can be used remotely. The touch-tone keypad can be used to pro-vide numeric input to programs or the alculator from a remote site (programs are loaded by
 - ecoding touch-tone trauences).

VOICE

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- Give commands over

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fece and conversion of voice into data and beck again. This enebles one to give and recieve spoken messages from eny location, as well es storing the message for later transcription. The SECRETARY is the basic system with these features.



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operations
These software
packages can be
operated through
voice recognition
(even over telephone)
with voice output,
through the telephone keypad with
voice output or
through the IBM PC
keybadra

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is added. The modern enables the MANAGER to



MANAGER \$19951

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 ComNet Software

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- . Two (2) cables one (1) seriel, one (1) parallel

computers

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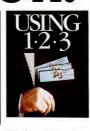
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The Executive Pockage Alpha Software Corporation 12 New England Executive Park

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List Price: \$145 CINCLE 700 ON READER SERVICE CARD Initial encounters with personal computers, it seems, heve spewned more horror stories than Alfred Hitchcock toxic waste end mothers-in-lew combined. Little wonder then, that the neophyte ap-

HF BASIC-Power lesson vlan is designed for complete consumption in one

sitting. proaches a Personal Computer about as calmly as be would epproach a rabid

animal On your own, there is no easy way to establish a friendly relationship with the IBM PC. Trial-and-error training can take weeks, months, years-even centuries.

This is clearly too long when your department manager expects you to be producing valuable reports on your new mechine before the IRS arrives for the audit tomorrow morning.

One alternative is the traditional one: Pick up a book or two during your lunchbreak. Dozens of texts are waiting to introduce you to your new computer, the BASIC language, VisiColc, and its spreadsheet brethren. But books by and of themselves are not the answer.

Even if you do happen upon e book thet's both lucidly written and thet makes sense to you [there are several good texts available, it should be noted), you still fece e mejor burdle, namely, your first few keystrokes on the mechine itself. Proficient typists have been known to develop a form of digital paralysis upon their first encounter with a computer keyboard. It's almost as if somewhere In the collective subconscious there's a primitive suspicion that pressing the wrong key will cause your new \$5,000 investment to irretrievably collapse before your eyes. Furthermore, using a book to learn about your computer seems retrograde, and for this purpose et leest, anachronistic.

Heppily, there is an alternative. You

USE YOUR computer to teach yourself about computers.

can use your computer to teach yourself about computers. A growing collection of training, software for the IBM PC is designad for exectly that purpose. Programs to introduce you to your new machine, programs to halp you get your fingers on BASIC. VisiColic and other epplication programs, and even programs to improve your programsing skills can now be found lining the shelves of many

If you've just bought an IBM PC, if you're just thinking about it, or if you hava a mechina that's gatharing dust because it's unable to read your mind and do what you want it to, one of these programs may be abla to help you put your invastment to better use.

Evaluated here are five selections that nelp get you started. The Gets Training Program for the IBM Person of Computer user: a similer at the first-tilma computer user: a similer at the first-tilma computer user. Training institute's IATH Bosic-Power (for VisiGole) training disks end hendbooks essist the business-computing beginnar who wants an introduction to what these application programs can do on his PC1: and the Alpha Euccutive Pockoge can help home your BASIC or and word business computer books of the Park Secretary Pockoge can help home your BASIC to real-world business to mobilems.

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computer stores.

bill, Cdex Training for the IBM PC is eimed et you. The undarlying assumption of this software peckags is that you bought e PC and managed to figure out how the on/off switch works, end nothing more.

The program begins by drawing e picture of a disk and a disk drive. It has ture of a disk and a disk drive. It has less you the proper way to put a disk into the drive. However, the program does not reveal by what mysterious process it assumes you got your first Cleer disk into the drive so that you could learn how to put a disk in the drive in the first pleca. (Maybe Cdex hopes the IBM will deliver PCs with their initial treining disk elready in the A drive.)

In total A curvey;

Ignoring this trivial inconsistancy, the
opprehensive computing beginner should
find a friend in Cole. The IBM PC training
program begins with e mean of subject
oncess that it will teech. There are ten
choices: how to use the training program
itself: psystam overview ("this is a diskette"); first contect (how to "boot" DOS);
system components ("this is a kayboard,
this is e monitor"); DOS; using BASIC
("first load BASIC, then run a program");

("first load BASIC, then run a program"); system details; advenced DOS; other operating systems and languages; and applications programs.

The lessons highlight the fundamen-

The lessons highlight the fundamentals of the areas they claim to covar. They tail you what to do without giving an indepth explanation or any background on why you must do things precisely tha wey you are told to. As my comments above may indicate. e Gew lesson exproximates



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managed to figure out how the on/off switch works and nothing

more.

the Monty Python explanation of the proper method of playing the flute: "To pley the fluts, blow in one and end move your fingers up and down." If you are expecting to become proficient on your PC, do not be misled into thinking thet equick run-through of this program will eccomplish that. But it can teach you how to perform elementary functions and give

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you en overview of the capabilities of the IBM PC. Moreover, if your fingers tremble over the keyboard because you're afraid e misteke will make the whole machine disappear in a cloud of smoke, the Cdex welk-through of the wonderland of computing will put your mind at ease.

Tha kay assat of this program, or any introductory software, is its simplicity. Just slide the first of the three disks Cdex supplies (enproprietely numbered) into your PC, turn the mechine on, end it runs itself, (Unless you heve an XT. Writtan in p-System, the progrem not only refused to run on the XT when I tried it, but left the floppy disk drive spinning madly away. potantially forevar.)

Besides helpful text, illustrations are drewn on the monitor screen, either to show mechanical relationships (drewings of disks and drives) or conceptual relationships (such es e Vann diagram showing disk BASIC to be e subset of Advenced

BASIC) To allay your fear of the keyboard, the program initially asks you to type in your name. When running, it simulates the PC-DOS operating system and BASIC, and asks you to type in commands. If the commands you type in are exectly correct, it congretuletes you end gives e simulation of the function being executed. If you make a mistake, it tries to take the sting out of an incorrect response with lavity: "Oops . . . your fingers ere having trouble finding the keys," it says et one point. The program automatically inserts the name you initially typed in to personalize the commants it makes to you ("Good job, Ratfink," it told me once. Of course, that was the name I gave it.)

Ales, although the program does tell you your entry is incorrect, it doesn't tell you whet you did wrong. Your only resource is to try again; the progrem assumes that you'll see the disparity between whet it asked for and what you gave it.

Along with the three lasson disks, the program set includes e handsome reference manual in e vinyl-covered loose-leaf binder. The printed metarials explein how to get the lessons up and running, give e keyboard reference (telling which keys do whet), provide e DOS Command Raferance to supplement and simplify the IBMsupplied meterials, and present a list of exercises to reinforce whet you have learned.

When it's time to change disks, the pro grem prompts you. I had no problem with this-except that disk number three ebsolutaly refused to run. Consequently, I may never know ebout other operating systams, epplications progrems, or whether the lessons have a happy ending.

Should you be able to finish all the lessons, you'll know how to handle rudimantery DOS functions like formatting end copying disks; renaming, comparing, and arasing files; and booting up. Although you will not learn the intricacies of assembly-lenguege progremming or how to make Beef Wellington, you will know bow the individual parts of the IBM PC work together es e system.

Cdex on VisiCalc

A knowledge of PC-DOS will help you run your computer, but without an epplicetion progrem or knowledge of e programming languaga, you're not likely to be able to do much of anything useful

Personel computers initially proved their worth in business by running electronic spreadsheet progrems that belped executives make projections and answer "what if" questions. Unfortunately, most businessmen ere es unfamiliar with electronic spreedsheets as they ere with personel computers themselves. The organization, capabilities, and even the language of spreedsheets are something many have naver encountered before.

HE PROGRAM assumes that you'll see the disparity between what it asked for and what you gave it.

Cdex Training for VisiCalc is en attempt to help familiarize the computernaive businessman with the workings of the archetypel spreadsheet program. In

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style and appreach it strongly resembles its shilling lessons for the BMP C: It begins with instructions on how to boot the stylem and load the appreadchest program, then writures on to e manu of the functions of the state of

The training is hendied better than in the initial Cake IMP Cl lessons, and you get more of an explenetion of why things must be done in e particular way. The program emulates tha VisiColc worksheet. This means you'll see on your monitor what the worksheet looks like, and you will entar data into it just es you would with VisiColc, but the only commands and functions that you can use are those that Cdex tells you to use. When it's time

for a computation, the numbers change right hefore your eyas. "Thet's why it's called VisiColc," Cdex tells you.

Not everything is displayed on the screen, however. Often you are referred back to the manual for an elaboration on specific commands and for asceriass that help develop your 'visicole skills. One should be supposed to on-screen lessons. It list the keystroks asquares nacassay to create them to go along with the on-screen lessons. Precisely duplicating the listings on your copy of the rated Visicole program takes es sharp eye and close stempts to death, it can be supposed to the strength of the death of the death of the screen state of the screen strength of the death of the screen strength of the death of the screen strength of the death of the screen strength of the screen screen strength of the screen screen screen strength of the screen screen screen screen screen strength of the screen screen screen screen screen screen screen screen

After the Cdex training program teaches you e new function or command in VisiColc, you are given an opportunity to put your newfound knowledge to use. The quiz is optional, however, e menu of alternatives of the bottom of the screen includes the salection, "Skip", which ellows you to bypass the problem and to davance to the next section.

selections include "Hint." which points you to the proper solution; "Review" which sands you back over familiar territory for a second try; "Manu," which offers you a choice of other lessons or the reference menu to refresh your memory; end "Exit," which lets you give up and go get a hear.

When you finish with the training program, you have gained an overview of bow VisiGolc works and an understanding of its usefulness, but then you're over you own; putting it to work is up to you. You will have to daviop spreadsheat will have be daviop spreadsheat will have be davide perfectly a take working of the probably take working with the spreadsheat program itself for saveral months—you will no longer be in ease of your co-workers who are experts.

ATI: Another Approach At first look, "ATI Training's Bosic-

Power is unimpressive. Open the red, white, and blue box, and it's even less impressive, a genuina cardboard loose-leaf binder and a single disk. Aftar its initial bad impression, ATI's Bosic-Power MBASIC Interactive Training Disk and Hondbook had to be some progrem to earn espect from me. Its on-screen approach to training (however imperfect) does, in fact, deserve a salure.

I offer a saluta because not only done AT field you what to do to operate BASIC, it also talisyou why you must do!. Rather than just praising you every time you press the right hattons, it gives you background into the structure and workings of BASIC. For instance, Bosic-Power will show you o program listing, then break it down to show how each statement works in data input, output, or processing, in down to show hock and the processing, in down to show hock and the total works.

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untrained rather than untrainedle.

The Bosic-Power format is rather straightforward. You are shown a program line, told what it does, and commanded to

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duplicate the line by typing it on your IBM PC keyboard. Bosic-Power is as unforgiving of errors as is real BASIC. You must fix all your errors before the program allows you to venture on to its next tidbit. If you strike the wrong key, the program slows date entry as it insists that you go back and correct the error. The lesson is harsh, but it does enforce accuracy.

Unlike Cdex, the Basic-Power tutorial is shagle-minded and unrelnting. You must march through the exact sequence of screens that has been deemed the proper order for learning things by the program's creator, skipping ahead or lagging behind is not permitted. The rigid structure can be frustrating. As the program begins, your choices are limited to the introduction to BASIC. reviewing a specific area or ston-

THE SKIMPY training manual is little more than a rehashed listing of BASIC commands.

ping which takes you directly to the operating system. According to the lesson plan you must begin with the introduction to BASIC whenever you use the program. Every time you make that menus selection, you must start from the beginning, selection of the program of the program

Should you choose to "review" from the initial nems, however, you'll soon discover how to beat the rigidly structured system. "Review" dumps you into the ongoing lesson at e preset point, depending on your choice of what you want to review. If you want to desh shead, simply choose to "review" something you baven't done before.

The skimpy training manual provided with the program is little more than a rehashed listing of BASIC commands. Its few pages are perhaps more understandable than the IBM BASIC reference manual, but they hardly make exciting reading. The booklet is not nearly as complete as the IBM manual

When you finish the entire tutorial, you will not be a proficient BASIC programmer. Reaching that target takes insight that can nobbe pained from experience. But after you finish BASIC-Power, you will know bow BASIC commands are put together, and you'll be also be a best of but to the programmer's work. Bester Power to the programmer's work and the progr

Plan Power for VisiCalc

The approach taken by American Training International in Pion-Power: Interoctive Troining Disk and Hondbook for VisiCalc is very similar to Bosic-Power. So, sorry to report, is the packeging.

In some weys, Plon-Power seems more understending and understendable. When I made an error in an entry (intentional, of course), rather than just telling me that I had done something wrong and to do it over, the program told me what to do right.

RLAN-POWER has the same rigid, unrelenting structure as Basic-Power.

In other ways I was disappointed. Instead of discussing the complete array of command options available in VisiCole and their ramifications, Plon-Power referred me back to VisiCole handbook. If I had wanted to wade through the materials in there. I might just as well go through the VisiCole tutorial.



the Cdex VisiCalc training package, nor does the materiel on its single disk offer as much insight into the operation of the spreadsheet as Bosic-Power does on BASIC.

Plon-Power has the same rigid, unrelenting structure as Bosic-Power, however. If you interrupt the program for any reason, the only way to get back to where you were is by marching through all the previous lessons-unless you cheet by "reviewing" the lessons you heven't yet reached.

Plon-Power will not teach you everything there is to know about VisiColc, nor will it give you much of a view of the power of a spreadsheet program or how using one can help you in your work. it will, however, help you become familiar with a few elementary commends and functions of VisiColc end turn your PC into en educational tool.

The Alpha Executive Package Rather than trying to overcome that perceived fear of the computer (ell beginpers are assumed to have) with en interactive computer progrem. Alpha Software provides an audio tepe cassette. Drop the tape into your cassette recorder, and e mellifluous voice reassures you that computers ere our friends and that you've done the right thing by buying the Alpha Executive Pockoge. When slow-talking Mr. Mellow tells you to press e key on your computer, you hear the sound of him doing likewise, it's enough to rot your teeth. You almost expect a hand to come reaching out of the cassette recorder, to pat you on the head end reassure you that

everything will be ell right. While the tape might give you the impression that these folks think you're 10 years old, the rest of the program tekes the opposite teck. The Executive Pockoge can refine and hone your skills in using both BASIC end VisiColc in business manage-

Unlike the Cdex end ATI software, the Executive Pockoge is not interactive: Your computer does not lead you by the head. in fact, you can work your wey through

COMPUTER ACT

the Alpha Executive Pockoge without a computer at ell. The manuel conteins all of the lessons. The two computer disks provided serve as an electronic workbook

OH CAN work your way through the Alpha Executive Package without a computer at all.

to supplement the menuel and as a future (and potentially quite useful) prefabriceted utility-program library.

The Executive Pockoge presentation formet uses the straightforward casestudy approach fevored by the Harvard School of Business. First you read e scenario of the business situation, a problem that can only be solved by immediate computer intervention. With some hints from a wizened old expert wbo's been solving problems on his computer since before the electric light was invented, the solution and its transletion into BASIC becomes obvious even to the dimmest among us. As the problem is solved, a program is written out, and to save time it's provided both in BASIC and, optionally, as a VisiColc template on the accompanying reference disks. Although the dielogue in the scenarios is herdly Netional Book Award quality, the roughly two dozen situations presented are relevant to regular business practices, and the utility programs provided can be easily structured for your specific needs: edjusting prices to inflation, scheduling employees, project planning, inventory checks, end so on.

The underlying philosophy of the casestudy epproach is that you don't just learn how to write a specific program. Instead, you learn how to analyze a situation. determine a path to the solution of the problem, end implement that solution using BASIC. When a similar situation occurs in real life, you'll be eble to analyze it, perheps find e similarity to one of the problems you had worked on in your Executive Pockoge training, and apply that lesson to the reel problem.

As the situations become increasingly

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complex in the journey through the Exeutive Pockege, more sophisticated progremming techniques are introduced. Although you may heve fell like e moron while listening to the cassette tape, by the time you've finished the lest lesson, you'll feel like a programming expert—and you just mey be able to write circles—or loops—around the hackers in your office who pride themselves on never opening a book or reeding te trishing manuel.

took of resulting is training indianast.

The resulting is resulting indianast.

The resulting the resulting is a second place of the resulting the VisiCole sprendsheat place tronic spreadsheat, the approach fewored by Cede and ATI, Alpha provides files of deta and templetes to add to your own working program. Alpha relies on your learning the basics of the spreadsheat through the use of the tutorials provided with the VisiCole software itself. You should be resembled jeeniliar with the spreadsheat before you the Exocute the proper Cide or ATI Intuities proving a second to the proper Cide or ATI Intuities programs.

THE VISICALC supplement is included before the BASIC example situations it refers to.

The Executive Pockage comes in a cloth-bound loose-leaf binder the same size and format se stendard IBM-issue manuals. Its organization is a bit consumed—the VisiCalc supplement is included before the BASIC example situe-tions it refers to—but such problems can be solved by opening the binder rings and rearranging pages.

Compatibility Problems

After running through all five of the above programs on a current model IBM PC, I joined forces with Steve Little of ComputerLand in downtown Cleveland and tried the softwere on various IBM and IBM-clone computers. I wanted to see what you might expect should you be favored with a slight varietion on the PC

theme. We tried the following mechines: current IBM PC. IBM Personal Computer XT. Compeq. end Texas Instruments Professional running MS-DOS. The results were very much as we had expected. All programs heppily churned eway on the stendard PC and on the Compaq. The two Cdex programs, written in the UCSD pSystem, gave both the Texes Instruments Professionel and IBM Personal Computer XT severe indigestion; the ATI software ran successfully on everything but the Professionel. The BASIC files provided with the Alphe software executed on BASIC loaded into eny of the mechines.







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its contain complete, resdy-to-run programs. The programs are plar, menu-driven and written in BASICA. They come fullydocumented with listings, theory, equations and operating instructions. Use them as-is or modify and combine for custom applications. oftkit disks are copysble.



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Software for the IBMpc

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Engineering Software for the IBMpc

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engineering work. Emphasie is on combining computer graphics with engineering problem solving. Programs are included to interactively create angineering drawings, etore them on disk, recall, update, mergs, add physical properties such as resistance, thermal capacity and density, and rotate in 3 dimensione to produce isometric views.

After being stored on disk, the drawings may be recalled by applications programs which perform mechanisms simulation, heat transfer, metrix operations and optimization using Monte Carlo techniques. Programs are also included for Fourier Series and Transforms. These graphically display spectrs alongside we

All programs are menu driven, written in BASICA and fully ocumented and keyed to theory and equations

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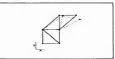
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graphics enhancements, and how to separate text from graphic on the PC's sceen. Contains 61 programe arranged in a tutoriel manner leeding from one step to the next. Math level is kept to a minimum and new con-

cept are explained as they are used Much of this softkit is based on the popular Bright Setwer to Microcomputer by B.J. Korites which was named "The Best Book on Microcomputers"

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Lynch, cofounder of Kennen Publishing. Lynch end her pertner, Ed Dudkowski,

Lynch end her pertone. Ed Dudlowski. believe in the "quick, total-immersion" philosophy of learning. Soon efter switching to complex discussion of the difference to complex discussion of the difference between RDM and RAM. In over my head elready. I stop and replay the section twice. Eventuelly the concepts sink in. One of the beauties of learning from a case steet, Dudlowski points out, is the ability to flip backwerd again and egain to absorb informetion et one's own pace.

Soon it is time for Chapter 3. "Assemin" During this section, emysterious blonde (throughout the tape has she shown only from behind points out computer parts as the americar gives computer parts as the americar gives interconnecting collest end plays. Like most other sections, the presentation is long end offers more feets than I can ebooth. Yet, effer having long considered computers unfathemable, I em relieved to hear their inner workings of described chemical computers unfathemable, I em relieved to hear their inner workings of the computers with the computer with the comp

Chapter 5, "Using Disks," turns out to

he my festorite. After sitting inscrively through four issens, being turned loose on the board produces of selling of liberation. The narrater explains how to put enw blank disk in the second drive for Formestting' and "initializing" to receive but em distressed to see the word: "N-VALID TIME" print out on the screen immediately after I insert the disk. The message, in gleritac quiptles, hacke me feel a bit stupid. After much bewilderment, it offices when the disk words and the three inserted the disk wrong side out. If here inserted the disk wrong side out.

ansk wrong side up.

My small calamity over, the rest of the
chepter's exercises go smoothly. At the
each the narmote tells me to eslect a musieach the carmote tells me to eslect a musipressing a key and hearing. "The Funeral
March of the Marionette," "The Mexican
Hat Dance," end Mozart's "Symphony No.
40" gives me a surprising thrilli only a few
hours earlier I hed been wary of the whole
enterprise.

Chapters 6 to 10 ("Running Software,"
"Software Overview," "Application Software," "Basic Programming," and "Graduation") are densely packed with informa-

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tion. Aspects of the VisiCoic software program are explained. Weys to produce the Dav Joses spect. UPI enew briefs, afring schedules, and entertainment reviews at the none are demonstrated. The internior time users will be able to greap everything in one stitting, learn certainly not one of the few. Yet Tm presently surprised et how much I have greeped, and sense I will be able to go back and learn the subjects I'ven missed.

Amysterious blonde points out computer parts as the narrator gives detailed directions.

Advantages of Video Tapes

Nearly everyone agrees that learning computing from the PC manual alone is difficult. The question for other first-time computing from the PC manual alone is difficult. The question for other first-time for the PC of the PC of

The tages also have an important advantage to individual private users: Private viewing helps dispet the intimidation that many first-time users feel. Sen Francisco accountant Bruce Breden of Alexander Grent & Co., say he originally bought one to "... overcome my computer phenol. I knew? I do be edinosaure rail and if I comfortable to be able to learn et home on WYCR." The embarrassments of first-time mistakes are also eased by learning a privet setting, on edvantage that many users mention gratefully, Dudkowaki says.

However, some experienced programmers favor video disks over video cassettes. They believe the disk's interactive chilities—gesticularly in pisponining where the user has mode on more—make teaching more effective. They also peaks transmission cores effective. They also peaks it random access, in contrast to the cassettle's random access, in contrast to the cassettle's random access, in contrast to the cassettle's residual coses. Some consider learning in a workplace with experienced programmers around to be ideal; here too, learning problems can be deelt with individually. Competition for market share does not oppear to be intense; the need for supplementary instruction seems to be strong mentary instruction seems to be strong

enough to support several varieties. Whetever the advantages of other learning methods, Kennen has reason to expect a good market. Since preliminary marketing efforts in February, Kennen has sold over 3,000 computer-instruction tapes of all types. (The compeny also produces tepes for the Apple II. Apple IIe. Apple II+, and Apple III.) Cassettes are evailable in both VHS end Beta formats. There are presently about five million VCRs in the country, according to Dudkowski. Presumebly, there's a large overlap between VCR and computer ownership, fueling interest in this method. Dudkowski predicts that, "If anything, we're at the beginning of a trend. We'll see this use increase greatly in the next decade."

Sales of the tapes have been greatlest to schools and businesses, atthough a substantial share of Kennen's market consists of private consumers. Mejor corporations of private consumers. Mejor corporations the have bought the IBM PC tape include TRW Corp., Georgia Power, GE Connecti. Hugher Aircraft, and Southern Natural Cas. Dudkowski says that IBM Boose Ration is using the tape for its employees and that other IBM corporate sites are investigating it.

"Large corporations often buy 500 to 1,000 mechines at a crack," says Dud-kowski. "Then you have e situetion where an executive walks into his office one Monday morning and finds on his desk an IBM PC, which he doesn't know how to use." In these instances, frantic calls are frequently mede to Kennen.

Dutkowski and Lynch believe the company's setting process sets its tapes opart. After each draft of a script, first-time unsers are invited to come to try out a tape and test it. They are asked to keep a log of ell unclear portions. "We bring in people who are afraid of computers—people who say things like, "Ill never learn this"—end we literally lock them in er room with the

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CIRCLE 130 ON READER SERVICE CARD computer and tapa," says Lynch. "Many are amazad when they later emerga computer literate." Tapes are rewritten until first-time viewers report no problems understanding them.

$P_{\scriptscriptstyle EOPLE}$

who've had machines for a week are upset because they still can't use them.

Filling the Information Gap

"We look at the tapes as a skeleton on which to hang all your scattered bits of computer knowledge," says Dudkowski, "We discovered that most people can't really learn computing from a manual, but that they often weren't getting what they needed from other sources. We also learned that computer manufacturers oftan incorrectly assume a high dagree of knowledge on the part of owners. That may have been true when the industry was brand naw and most of the purchasers were programmers. But there are a lot of people out there who need to know the basics. "We gat a lot of calls from people who've had machines for a week and are upsat because they still can't use them." Dudkowski says that Kennen also tries

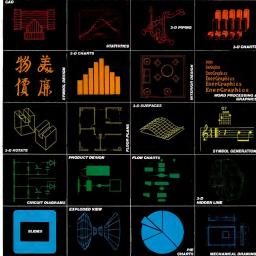
to fill the spup between the Information contained in the PC manual and that given on software, another of the acute "information problems" of consumers. "Chances are, if you've just gottan a computer and go out and buy, say WordStor, you won't catch on that you're supposed to install DOS." he says. "If you're lucky, the desiler will do it for says." If you're lucky, the desiler will do it for superior to the problems with the problems and the problems will be asset of the problems."

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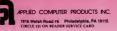
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Coming Attraction: The Super Video Instructor

Now, let's see , . . I've loaded my spread- On the Horizon sheet on Peruvian anchovy futures, subtracted the effect of the latest Japanese tsunami and added the impact of the increase in pizza purchases brought on by the down-to-the-wire American League East pennant race. All I've got to do is tell the program to Calculate. But what function key do I need to punch? I can't remember: I'm just going to have to type in the Help command from the keyboard.

The spreodsheet disoppeors from the screen. In place of the columns of nomes and numbers oppears the face of o friendly, concerned gentleman, his honds on the keyboord of on IBM PC. the very program ond problem you hove on the screen before him.

"Hoving trouble with the Colculote function? Here, let me show you how it's done. The first thing you should do is to sove on unoltered version of your numbers in case you want to retrieve them for some purpose. Just hit the F10 key-thot's this key here-and the program will do the rest. I'll woit while you do this

". . . Well done. Now let's colculote. Type the F3 key to sum the rows—like this-or the F4 key to odd the columns...."

It's no fantasy. Some developers say the next-and perhaps most valuabletraining device for microcomputer owners may be a video disk player. This is by no means a completely new technology. Video disk players have been on the market for several years, and most contain pro

grammable microprocessors that can be addressed by software. What is new is the combination of existing technologies and their application to microcomputer training programs.

The video disk offers two very important advantages as a training tool. First of



Larry Briggs, marketing manager for Timberline, runs through demonstration of Timberline's spreadsheet program on IBM monochrome monitor for Corey Sondler of PC. An instructional segment keyed to program is displayed in background.

age medium, like a floppy disk. Its laser technology ellows the reading head to move quickly from the beginning chapter to the end end back egain based oo com-

HOW WOULD a laser disk be integrated into an applications package?

mands from the keyboard or from an electronic index. This differs from serial storage media, such as video cassettes and audio cassettes, in which there is a significant loss of speed and flexibility because the tape must be wound or unwound from beginning to end to reach a particular point of information. The second advantage of laser disks involves the quality and flexibility of images. Resolution is claimed to be much higher than that presented by a video cassette player end the device can offer high-quality freeze-frame images, fast speed, slow motion, and reverse pictures. Top-of-the-line laser disk machines have been selling for as much as \$2 000

How would a laser disk be integrated

into an applications package? A software sultro could include help-feeture sauthor could include help-feeture sauthor could include help-feeture students that tell a disk player to displey a specific video instruction on the computer sort on an accessory monitor nearby. A vider switching device would direct on the proper signal—from the disk player or from the computer—to the screen day the player or from the computer—to the screen sort some sort south or the same sort of the screen sort of the screen sort of the screen sort south or the screen screen sort of the screen screen sort of the keyboard and the contents of the computer's memory.

One of the first applications of the concent is working its way toward release at the end of 1983. Timberline Systems, Inc., an established software house in Portland. Oregon, plans to offer its dealers a ComputerActive Video System based around a laser disk player, a video controller, and a sales and training disk. Timberline, which has been producing finencial and accounting software for minicomputers for more than 10 years, entered the microcomputer marketplace this year with its "Medallion Collection" of productivity and general accounting packages. First versions of the programs cen run on the IBM PC. DEC Professional end Rainbow. IBM Displaywriter, TI Professional, Apple III, Osborne, Sage, and similar machines.

The Timberline effort is the result of a joint research and development program with ADI America (e California software

company), Sage Computers of Reno, Nevada, and Computer Active Video, a Portland firm seeking to carve out a niche as e production company for laser disk training.

"We think the video disk player will become a peripheral to the microcomputer," said Larry Briggs, merketing menager of Timberline. "And we want our dealers to be able to use the device to demonstrate, sell, and train customers on our products now."



An image of spreadsheet program is shown in the foreground. To the left is the instructional segment, to the right the video disk player.

The View from Timberline In a visit to Timberline's Portland

offices, we saw en IBM PC running the company's spreadsheet program on a standard IBM monochrome monitor. Sitting oext to the PC was a composite color moo-

Sears Catalog Goes Video

A streamlined new image for that old American standby-the Sears' catalog

Take a molded plastic disk that looks like a phonograph record but stores data rather than doo-wop. What is it? A video disk. Mix in the nation's largest retailers end you've got ao updated version of an American classic; the Sears catelog on video disk.

In the summer of 1981, Sears put its 236-page summer catalog on video disks and distributed them in nine stores in the Washington. D.C. and Cincionari areas and in about a thousand homes across the country in a murketing experiment. The company was restring two ideas: its customers' reaction to sophisticated video technology and its own shifty to create it. Both the shoppers and Sears scored well.

Sears filmed 17,872 items from its



A shopper flipping through screens on Sears' Tele-Shop Catolog.

quarter-inch-thick summer catalog and packed them onto a disk that was about 12 inches in diameter, end only $\frac{1}{2}$ of an inch

thick. The heavy, oft-attered book became the sleek Tele-Shop Cotolog disk filled the sleek Tele-Shop Cotolog disk filled she had been been been stated to still photographs of items like camping supplies and tennis shoes, Sears included 17 sequences that showed its products in action. Shoppers wutched Cheryl Tiegs modeling her line of outographed clothing, for example, and saw close-ups of a Sears gas grill broiling a steak at a family absreque. If these scenes soom like combardeque in the same scenes soom like comtion-mercials because they're "onb had sell."

The video disk system operated on by menu scheme. Shoppers punched a keyboard to call up a main menu of goods available through the catalog. If they chose itor linked to a Pioneer laser disk player through a "black box" called the "Universal Video Controller," manufactured by Allen Communications of Denver. The PC communicated to the video controller through a standard RS-232C serial port and cable

Briggs admitted to a few software bugs involving the UCSD p-System coding from the IBM PC to the video controller. As a result, most of the demonstration was conducted using a Sage microcomputer. Unattended, the video disk player showed Timberline's colorful mountainton loao.

JOME
developers say the next
training device for
microcomputer owners
may be a video disk
player.

together with an invitation to a viewer to press any key to start the demonstration. The monochrome computer monitor had a similar invitation for the spreadsheet (Double Monitor Configuration)

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Video Disk-PC Connection

application. Sending the signal from the keyboard triggered the computer's runthrough of the program, interspersed with comments and demonstrations from the

video disk

The version demonstrated used two monitors. It should be possible to have a system that would use just a single color

the category for "outdoor paid furnitume," you'd see another ment from which you might select "table umbrella sets." From there, the color sereen would display the Seans selection. If the pink, and greenstriped job with the lace fringes looked like just the thing, the shooper would refreez "the video display at a frame containing the necessary ordering information. The marvels of technology stopped there, bowever. It was still necessary to pick up the phone and dial in your pick up the phone and dial in your

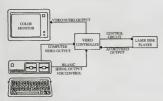
For Sears, the disk has several advanlages. Video disks speed forward or backward at high speed or stop altogether to permit study of individual pictures. Then there's the "random access" feature. People can look at items in the catalog in any order they choose, with no need to flip through thousands of video entries before arriving at the desired product. "It's a little like playing a video game on a television screen. You're in complete control," said Robert E. Wood, a Sears vice president for advertising and sales.

According to Sueri surveys, customers were pleased. Catalog sales didn't increase in the homes or stones with video disk catalogs, but they didn't drop off, either—perhaps a sign that people were susing the machines. For from feeling that cold-fashioned American institution, people seement of enjoy watching the video disk presentation. According to a Sears spokesman, one cliefly woman walked away from the turn at the Tele-Shop (2d. "Fun, fin, fun!"). and the system was

One limitation of Sears' video disk experiment was that it didn't provide a way for shoppers to order directly from the screen. In other experiments, though, the company has been moving in that direction. In Coral Gables, Florida, for example, Sears joined with the Times-Mirror Company to test viewer response to interactive cable advertising, perhaps a

step toward putting the catalog on-line. Sears stopped running its video disk test after the summer of 1981, but the company has high hopes for the future. After all, the general catalog has grown to 21/2 inches thick, and Sears spends about three-quarters of its multi-million-dollar catalog budget on paper, printing, and mailing. The video disks may present a cheaper alternative. Catalog sales have increased in recent years, in part because working women who don't have time to shop are more likely to order by mail. With catalog transactions making up about 20 percent of Sears' \$20.67 billion sales, video disk merchandising is clearly an idea with a future. -Koren Cook

Video Disk-PC Connection (Single Monitor Configuration)



monitor, substituting the training segment for the computer displey. The present roadblock is the fact that output from the laser disk player is composite video, different from the monochrome signal or the RGB color output produced by the PC. At leest one menufacturer is now offering a color monitor that can be switched from

ne signal or the for word processing.
d by the PC. At Briggs said that the production costs

for the group's 15-minute pilot ran about \$20,000. For their money, the partners received e totol of five laser disks. Briggs seid he expected the next version of the disk, which will include most of the first 15-minute segment, to cost another \$20,000 or so.

composite to RGB input, which may sol

that problem. Another difficulty, though, may lie in the difference between the optimal viewing distence for e pictorial image es opposed to a text image. Viewers ordinerily watch television from forther away

than the working distence for e monitor

manufacturer is now offering a color monitor

that can be switched from composite to RGB input.

"The production costs are not miniscule," Briggs said. "But we see this as very important to our vertical marketing. We went to be identified as being on the leeding edge, end we elso went to sherpen our own skills."

"You don't just put e pege of documentation on the screen. The video disk puts our training and marketing in a different light. We expect a lot of spinoffs to justify thet dollar expenditure."

Timberline expects to hew 200 dealers for its microcomputer products by the end of 1983, 500 by the end of 1984. Briggs said he expects that about half of these will opt to participate in the video disk program, which will include some sort of special purchase errangements for the deeler. Bosed on today's prices, the player, monitor, disk, and controller will cost about \$4,400.

Whether Timberline's effort turns out to be e lendmark in computer-besed treining end merchendising remeins to be seen. However, the concept—from video disk, video cassette, or other source yet to be applied—may point the IBM PC in yet another direction. /PC



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*PN Programming needed to provide this capability.

In practice, disk capacity limits file size (s.g., a single sided disk with 200 characters/record will become full at about 700 records).

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Why can't computer manuals learn to speak?

We doubt if even My Foir Lady's Henry Higgins could provide the answer to that one. Fre outloor is even my rose anny 3 ments ringgenes could provide the classifier to that one. But it's the question on almost every microcomputer owner's mind. Many a would-be but it is the question on attack every narrowentpoint owners a minu, many a mounter of the commentary many and a mounter than the opening pages of a computer program's "documentary and a computer program's "documentary and a computer program's "documentary and a computer program of the commentary and a commentary and a computer program of the commentary and a comment uses mas gotten to surrout man one opening pages or a computer program a uncummitation" before retreating in panic to his trusty old typewriter and pocket calculator. Many an expensive program sits gathering dust on the shelf because the owner has given up all hope of mastery.

an nope or mastery.

So, like Eliza Doolittle, we went to an expert in hopes of a bit of help. PC Mogozine asked Sheila Tucker, an editor with an internationally known literacy foundation, to asked ones at sucker, an busine with an internationary known interest rounaution, to take a look at a sampling of popular manuals for the PC. Her grading and her comments on possible improvements would well be noted by the illiterate flower girls she

We also sought the comments of a frustrated, literate user. A. Scott Earle, a Shaker we also sought the comments of a ruburanco, merane user. A. Scott barre, a shaker Heights, Ohio physician and author, sounds the call for a round of manual dexterity in the article that follows, "The Literate Idiot: A Reader's Best Friend."

If only the producers would listen—we'd all make it to the bank on time. —Ed.

There are fundamental rules for writing instruction manuals. In the rush to market, most technical writers have not bothered to learn or apply them.

Why Computer Manuals Drive Everyone Stark Raving Mad!

Manuals! Everyone has a horror story about some piece of hardware or software documentation. Many cleim to ignore the manuels, et least as long as possible. Why are they so bod? Is it the writing? Or is it the reader? Perhaps it's a little of both.

As adults, we no longer learn the way

As adults, we no longer learn the way we did in our youth. Children are constantly exposed to new material, and rely more on "fluid intelligence": the ability to perceive complex relations, engage shortterm meanry, form computs, and use

abstract reasoning.

Adults rely more on "crystallized intelligence," which combines fluid intelligence with cultural knowledge. Adults look for femilier cues to guide them. An individual's outlook and personelity can

greatly affect his approach to learning.

The computer offers e whole new set of language petterns and symbols, which are unfamiliar to the average edult; this requires a return to the mentel attitude of our youth. He approach believes he can deal

with a situetion, it may be e challenge; if month in the most in the most interest. Therefore, when the edult is studently thrust into learning situetion thet requires fluid intelligence, manulas should be designed to present the information in on on threatening manner. Clearly-written explenions are needed rather then on overwhelming number of new terms and symmotion. A person's estilly to retain information in immediate access and short-term preserve for fast, it evidately a table discussion of the control of

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ing most of adulthood, but certain criteria must be observed. The material has to be meaningful, and the amount of information to be stored can't be too large for immediate access memory.

With this in mind, four manuals have been evaluated for readability: the IBM Guide to Operations, The Home Accountant, Hoyes Smortmodem 1200, and dBASE II.

There are several indexes for evaluating reading levels. The Gunning-Fog index, which uses sentence length and word difficulty to determine the reading gaide level, in one. The Try Index (see Figure 1) is another. It uses sentence length and syllables to determine the level. Reading materials are also judged on layout, logical presentation, and writing style.

IBM Guide to Operations
Of the four manuals listed above, the
IBM Guide to Operations (see Figure 2)
wins the prize for readability, clarity, and

wins the prize for readability, clarity, and layout. It is written at a 6.5 grade reading level and lists step-by-step procedures in clear, short, precise sentences. The abundance of white space on a page reduces stress and makes the manual look easy. This promotes confidence in the reader.

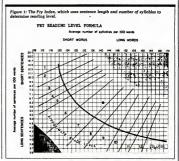
The text is complemented by detailed, explanatory illustrations. The IBM manual also includes notes related to possible problems and their solutions at the points

THE COMPUTER offers a whole new set of language patterns and symbols, which are unfamiliar to the average adult.

where they might crop up.

There is perhaps only one stumbling block in using this manual. You must know the exact features of your hardware to proceed through the various diagnostic tests. In fact, this is true of all four manuals evaluated.

Do you have one fixed disk drive or more? is there a color/graphics monitor? A game control adapter? Can your hardware support an RS-232 Interface? What is the



DIGITAL DIMENSIONS

CAL

Figure 2: Excerpt from the IBM Guide to Operations

You cannot damage your IBM Personal Computer by pressing any key or combination of keys. You may not get the results you are looking for, but there is no way you can do any harm to any part of the computer, by pressing a key.

Figure 3: Excerpt from the Home Accountant Pius manual.

Press any key after the blank diskette is inserted and the drive hatch is

Disk drive B will whirr and buzz for a while. When the sound stops, the system will display a message to tell you formatting is complete. The message will also indicate how much space is available on the diskette if you are using DOS Version 1.10.

You now have a formatted diskette ready to receive data. Formatting completely erases a diskette, so be careful not to format a diskette that contains information you may need later.

NOTE: When you start a new system. THE HOME ACCOUNTANT Plus will not accept diskettes that contain any HOME ACCOUNTANT Plus data files. This feature is designed to prevent you from accidentally destroying important data.

range of transmission? A PC owner will remember some of these features, and of course he can refer to the manual. However, it would be handy if each manual had a page in front where you could check off the features of your hardware for ready

NSOME

instances you discover what you shouldn't do after you've already

done it.

reference

The Home Accountant Plus

The Home Accountant Plus manual is written at an eighth grade reading level. It assumes that the reader knows very little about computers and even less about the language of budgets. Terms are well defined, as are the various modules offered The action instructions are in boldface, and the screen responses are graphically separated from the text; both of these features increase readability.

There are, however, some problems in this manual. There is very little white space, making the material look more difficult than it actually is. Worse, in some instances, you only discover what you shouldn't have done after you've already done it. An example of this appears in Formotting o Data Diskette (see Figure 3).

After proceeding through 12 steps, you are suddenly confronted with the news that "Formatting completely erases a diskette, so be careful not to format a diskette that contains information you may need later." Obviously, it was assumed that you would read all the way through the instructions before formatting. Why not place this information up front for the benefit of the users (probably a majority) who would work through the procedure as they read?

The Home Accountant Plus program does have some good features. It has logical codes: R stands for Run, X for Cancel, Y for Yes, and N for No. And the length of the manual is just about ideal. (Studies indicate that a program three times longer than another is nine times more difficult to read and comprehend.)

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Figure 4: The dBASE II monual: initial instructions

Typographic conventions used in this manual:

Lowercase in the screen representations indicates material that you type in.

Uppercase in the screen representations indicates the dBASE prompts and responses. In text, uppercase is used for dBASE II commands.

Figure 5: The dBASE II monuol: function symbols

FULL SCREEN EDITING FEATURES:

ctl-X moves cursor down to the next field (or ctl-F).

ctl-E moves cursor back to the previous field (or ctl-A). ctl-D moves cursor ahead one character.

ct1-S moves cursor back one character.

ctl-V toggles between overwrite and insert modes.

ctl-G deletes the character under the cursor. (Rubout) deletes the character to the left of the cursor.

ct1-P toggles your printer ON and OFF.

ct1-Q quits and returns to normal dBASF II operation without

making changes, even in the MODIFY mode.

The Haves Smartmodem 1200 Manual

The Hoves-Smortmodem 1200 menuel is written at a tenth-grade reading level. It assumes that you heve thoroughly researched your communication needs end that you have some idea of what this system will do for you. There is no question that technical knowledge of the hardware is necessary. You must be able to adjust the transmission speed of your equipment to use this remote system. If you do grasp the technical details, you should have no difficulty implementing the system with this manual.

The dBase II Manual

The dBASE II manual is a different matter. It appears not to have been designed for human consumption. It inspires an overwhelming urge to summon the PC owners of the world to unite. seize the programmer and the manual writer, and place them in a rat maze so that they may experience a little of the stress and frustration that they create. The frustration begins with the initial instructions (see Figure 4). Why does the manual use uppercase letters to represent dBASE II prompts and responses in the screen representations, while using them for dBASE II commands in the text? How can the reader keep these conventions straight? The reading level of this menual is

ninth grade but this tells you very little about the intelligibility of the content. First, blocks of uppercese text are hard to read because all the letters are the same height, and there is not much difference between the shapes. Lowercase, with its letters of different shapes and sizes, makes

LHE dBASE II manual appears not to have been designed for human consumption.

recognition easier.

The typeface is not the only difficulty. The symbols used for the various functions (see Figure 5) do not lend themselves to free association. They are therefore difficult to remember

It would have been easier if B had been used for "back one character." D had been used for "down to the next field," A had been used for "ahead one character." end so forth. The users of this manual will probably just resign thamselves to copying this page end taping it to their com-

The manual also supplies "informa-

PC MAGAZINE 200 AUGUST 1983

tion" at the wrong places. "You'll find out about this as we go through dBASE instructions letter in this manual." Why not tell us where? Or, on page 2s: "You can also use "SKIP" ± (wariebole*expression), with a number of records skipped determined by the velue of the variable or expression (both defined later)." Thanks!

KEAD the manual once or

the manual once over lightly before you begin in earnest.

Stress is built into the program itself as well. After a set of instructions, you are told that "QUIT" must be typed every time you terminate e dBASE II session. "This automatically closes all files properly. Unless you do so, you may destroy your database." Destroy your database? "Destroy your database? Why wasn't something said about this sealife!"

Another example of a stress cue appears on the bottom of pege 28. In en note about the command "PACK", you are told, "Once you use this commend, the records are lost forewer." Unfortunately, this information may come too late to prevent you from dispatching your records to the great bit bucket in the sky—"forever."

However, you can deel with this stress, and overcome the confusion in this men-

- Read the manual once over lightly before you begin in earnest.
- Work in a comfortable, properly illuminated environment.
 Relax. There is no need to rush.
- Use different colored pens to underline commands and responses.
- Highlight those dengerous commands that can wipe out your efforts.
- Resign yourself to teping a copy of the mejor codes to your computer for ready reference.
 These techniques can be useful for any manuel. You con be in control. It's just a

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New Rule: Henceforth, program designers may not write their own documentation. Manuals should be collaborations between techno-geniuses and literate idiots.

The Literate Idiot: A Reader's Best Friend

One of the biggest and most time-consuming frustrations fanced by microconductures users confronts them when they try to unravel and make sense of the directions—the "documentation"—that accompanies software. Apparently feat to accompanie software. Apparently feat are ser as a paperd; it's not at all unusual to to read a review that praises a program print as a program and damning its documentation. Is this discrepancy in quality between programs and the instructions that accompany them necessary?

If you are a naw IBM PC user the following scenario is probably a familiar one. You order a program that was weil reviewed—one that "might be useful to any PC owner." The reviewer mantions that the documentation was not the greatest, but that this deficiency was more than offset by the program's value.

The diskette arrives in a neat plastic folder with a six-page booklet of

instructions that is, fillingly, reproduced from a computer printou. The booklet tells you that you are the owner of a program that is "innovative and useful allows you to take full advantage of the programmable analyte of the BP object without having to be a programmam." The manual goes no to say the programmable and goes no to say the program is "an on-line macro processor." It provides no suphantalon, however, the caucily what a macro processor (on-line or otherwise) actually is.

The directions continue. Tarms like "file write, not a merge," "hardcopy refarance," "string definition," and "scans its own playbacks," are piling up one on top of the other, but there are few axamples in the manual that might help to explain what any of these things are.

It costs you a great deal of time to figure out how to use some of the simpler commands. Others, like storing and retrieving files, remein a mystery. You suspect that there might be a lot of things that this program could be used for if only the documentation were a bit clearer. Finally, in desperation, you call the softwere compeny for help.

This scenario occurs so often in the lives of new PC users that it seems to be part of an obligatory electronic initietion into the frustrating world in which new computer users live.

Recently, totally thwarted in my attempts to learn how to use a program, I wrote to the software company for assistance. I did not condemn the program as such—indeed, it did eventually turn out to be very useful—but I did condemn the documentation.

The return letter from the president of

the company did not come right out and say that I'd kicked the balpy, but I got the idea that he thought so. There was also a wifilf of sarcasm in the instruction included in the letter, most noticeably where he mentioned that "the word <=nter> means to press the gray key with the hooked arrow on It—just above PISC:." This experience somehow summed up all of the frustration that I—and many other of the frustration that I—and many other of the frustration of the III of the odecipher the instructions supplied with processing.

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Wasted Potential

Today, new progress of general linterset en reviewed in computer megazines and even in newspapers. The New Yock Times has a computer column; so does my hometown Cleveland Pélon Deoler. Buyers usuelly hewe e pertity good dies what they are going to get when they plant, buy, a lot of this software is used far below capacity. This is often not the result of poor selection on the buyer's part of this inability to figure out bow to use the program.

Too many programs are shed down by their own submire, who believe they can explein how to use their creation. In most cases they twe roon, Creating and explaining are seperate leients and they require separate opproaches. An author who writes a program designed to be used by writes a program designed to be used by a really known enthing except that the program was designed to carry out certain functions. It should go without saying that e buyer ought to be provided with directions that are clear enough to enable him

THE WORD <enter> means to press the gray key with the hooked arrow on it.

to use the softwere.
In the reel world, however, the person

al computer user is often disappointed and frustrated es he tries to decipher the documentation. Time is simply too valuable—especially for professionals, many of whom now own IBM PCs—to invest hours and days compensating for inade-

HOSE WHO are writing the manuals and the booklets simply know too much.

quate and incomplete instructional material. This mey make little difference to the software producer; he has his money. This myopic attitude won't help much if you're trying to build a software empire.

One of my physician ecquaintences recently told me that he hed purchased e database menegement program written especially for the PC. He knew nothing ebout databases, but he did know that he wented to put together e list of petients with similar diagnoses. The author of the progrem wrote that he had "one overriding goal in mind. Ease of use." The buyer was essured that most people would be able to use the program with no training or Instruction. Then the menuel really took off: into data fields, clones and reports. subsets, sorts, index rebuilds, shell sorts. and record layouts. And there was not e single definition, not a single key-by-key example to define the terms or explain the use of any part of the program. The diskette is just gathering dust.

Could the instructions for this program and others be written so that they could be understood by a noncomputer person of everage intelligence? The answer to this question is of course "yes," but it is not easy to do.

Modest Proposals

The following guidelines for writing program documentation might help solve some of the time-consuming start-up problems that many encounters.

"Documentation" should be informative; all necessary information should be included in the simplest possible manner. A new owner should be able to use the program effectively after reading the instructions. Trips bock to the store or let-

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CINCLE 400 ON READER SERVICE CARD

tars and phone calls to the software provider should not be an obligatory part of owning a piece of software. One naw PC user found that the manual that came with his word processing program did not even tell him how to load the program. Evidently, loading was falt to be so easy that instructions would be superfluous. Well, it is easy—when you know how.

New years that is unusual, and every cummon word that i given as special meaning, should be clearly defined. See a second meaning, should be clearly defined. See a second was a second more peeple who Peak years and the second was seen as the second was second was seen as the second was second was seen as the second was second was seen as the second was second was s

 Examples should be provided of how to carry out each step, key by key. Put them in a special appendix if necessary, but the new user needs this kind of halp. Key-by-key examples can help the user make sense out of parts of the main documentation that were obscure previously. For example, the WordStor Training and Guide can be a litesawer. The WordStor of manual may make sense for some users only after they've mastered the key-by-key anolications in the Training Guide.

■ Instructions should be pleasant to read. They should be interesting enough for the user to want to read tham; using the instructions should not be a last desperate measure. Such documentation does axist: a good example—although it's not for software—is the Epson MX80 manual by Dr. David Libra.

Why is there a problem with documentation anyhow? Programmers and computer engineers are intelligent. So presumably are users. Why, than, is it so difficult to explain in writing how to run a program? The answer is that those who are writing the manuals and the booklats simply know too much. What is really needed during the preparation of documentation is a collaboration between the individual who wrote the program, and a literate idiot who

MORE AND more computer illiterates will be punching the PC keyboard in the very near future.

doesn't how anything about writing programs or building computers, andied who has to sweat to make the computer, the printer, the software, or whatevare, do what they are supposed to do. An iddio-L'm, not proud, I'm one myself—who has made every stupid mistake possible, who has an inhorm ability to misunderstand the simplest instruction, for whom an open line to Computeral dia a necessity. Such a certified computer has sometime and the supposed of the computer of the comput

Someone who is comfortable with computers may not be comfortable with or adapt at language. Indeed, for many individuals, mental ability in one area seems to be inversely related to mental ability in anothar. (Hava you ever noticed how many spelling errors there are in computer programs and documentation?)

Computers, their peripharal hardware. and the growing mountain of available software deserve good documentation. Pooriy written and inadequate instructions are a problem for everyone. This article is a plea; a plea for directions (okay, documentation) that can be understood. Directions written by someone who can write tolerably weil, and who can explain in intalligible terms how to get from A to B. Ready or not, more and more computer illiterates will be punching the PC keyboard in the very near future. I suggest that it might be worthwhile, when a program is completed and it's time to write the documentation, to have at least some input from a computer idiot with verbal skills.



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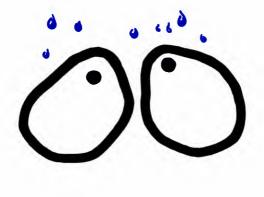
Done.

And, of course, staying the best means constant reviewing and fine-tuning. Keeping the Gemini easy to find, easy to afford and so reliable it can be warranted for up to twice as long as its major competitors.

Only the most careful engineering has built the new hard-working Gemini-10X. You'll applaud its performance.







HOW TO BREAK INTO WORDPROCESSING WITHOUT BREAKING INTO A COLD SWEAT.

Word is out. There's a new wordprocessing program that's easy to learn and to use and that takes advantage of one of your greatest assets: common sense. The name of this powerful program? EasyWriter II.*

EASY TO USE, OF COURSE.

Even though EasyWriter II is loaded with all the features you'd ever want, you'll still find it easy to get to know. With the friendly manual and a couple of serious hands-on sessions, you'll have the commands working for you, not vice versa.

...WITH FILE NAMES THAT ARE EASY TO IDENTIFY.

On EasyWriter II, you can use file names up to 30 characters long, instead of 8, like other leading systems. So your report on Marketing Soft Lenses, 1883 can be called that instead of MKSOLE. 83. Think of the time you'll save when you can actually identify what you're looking for.

... AND A TEXT THAT'S EASY TO CHECK.

EasyWriter II shows you onscreen everything you're typing. Like underlines and BOLDFACE. You know what your text is going to look like when it's printed — before it's printed. Try that on other systems.

EASYWRITER II: RULER OF THE WORD.

EasyWriter II lets you create multiple rulers (margins) and save the commands in the document. So you can reformat in one quick

pass, with variable margins and tab stops. INTERACTION. MAKES OUR FAMILY EASY TO KNOW.

Once you learn EasyWriter II, you can produce an EasyPlanner' spreadsheet or an EasyPlanner' spreadsheet or an EasyPlan formation system using similar commands. We call this compatibility our interactive system. When you learn one, you're just a keystroke away from command of several EasyFamily' programs.

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While a Local Area Network can offer marvelous facilities, a LAN may not be the answer for everyone with multiple microcomputers.

To LAN Or Not To LAN

Local Area Networks (LANs) are wonderful things. Everybody with two or more PCs needs one, right? Wrong! Not everyone with several microcomputers needs to network them together, and even those who would benefit from a LAN might not be served well enough by those available today. We need to look at who needs a LAN and who doesn't. After we separate the needs from the wants, we'll examine what the market offers now for the IBM PC and what the future might hring.

To LAN or Not to LAN?

Having writtee a book on local area oetworks and being presently involved in selecting LANs for installations ranging from embryonic to ecormous, I am obviously enthusiastic about the technology. LANs have helped me professionally, and they have helped me make money-but I would be the first to say that they aren't for everybody. If you have a oumber of micros and you just want to swap files and programs, a LAN may not be what you

The transfer of program and data files

between computers has been a problem since the first computer found a mate. The problem is aggravated for microcomputers, as well as larger systems, by the number of operating systems and disk formats that exist. A program will not run on two physically identical computers if they are using even slightly different versions of an operating system. The problems with disk

HE MOST effective user of a LAN is an agency or organization needing simultaneous access to a chanoino database.

formats range from differences to physical size to differences in the location of the directory track on otherwise physically identical diskettes.

You Don't Need One if. . .

organizes files and the physical disk characteristics can limit the transportability of data files. If you want a local area network to help you with program and file traffic between even slightly different systems, you are probably in for a rude shock. A LAN is not designed to abet program transportability, and many microcomputer LANs will not even provide data file portability between terminals using different operating systems.

Both the way the operating system

Today's gardeo-variety LANs do not provide a magic interface that will allow a free flow of data between unlike machioes. They are primarily devices that provide separate users with the ability to access separate portions of the same hard disk. They will, with some limitations, allow the sharing of common files between nearly identical individual terminals. They require an investment of space, time, and money to do this, but in some cases, it may be worth the trouble.

You don't need a LAN if you plan to do

real-time sharing of information. If you have five authors who are working on related but separate documentation or articles, you can probably save the cost of

YOU DON'T need a LAN if you don't plan to do real-time sharing of information.

a LAN by sharing the data on floppy disks.

You don't need a LAN if your multiple micros are using dota files that don't chenge frequently. If you make relatively few changes on mailing lists, standard forms, or other static deta, the weekly or monthly updates on floppy disk would be sufficient.

Finally, you don't need the more commonly known of the IBM PC LANs to share data with other microcomputers. If the twapping is whet you need, I suggest you use the RS-232-C serial port and file transfer programs such as Microstuf's Transporter and Crosstolk. These programs, available for multiple operating systems, will allow you to share data between unlike machines.

If you think you need a LAN for electronic office services such as executive support [eddresses, calendars, etc.] or electronic mail, you are a fence-sitter in today's technology. Right now, the best peckages in this field are designed for centralized misicomputers that take care of the needed message storing, notification and log keeping. The software to do this on local area networks is growing, but it isn't widely wellahel or supported.

You Need a LAN If. . .

You can probably justify a LAN on a cost basis if you elready own a single PC with a good-sized hard disk (10 megabytes minimum) and went to make the harddisk capabilities available to other PCs.

The most effective user of e LAN is an agency or organization needing simultaneous access to a chenging database. Networks are useful for reservation services, parts warehouses, and processing plents. If you have large data files that are fre-

quently updated or if you want centralized control over the data, you can make good use of a LAN.

However, there are thorns among the rose seven with this find of optimum-use LAN system. It helps to picture a micro-computer LAN sa having all of the users connected to a bank of large-capecity flopy disk drives. Each user has one drive sasigned. The individual user can see a directory of the other drives and can copy files from other drives, but if two users work together on the same drive, they must do it like norcupiones making low-

very carefully!

Current systems require special software to perform a function called "semiphoring." This function is just as primitive as the flag signaling system it is
maned after. If I wo or more uses are
simultaneously working from the same
each try to open, close, and size the flag
phoring is a primitive portood pytem
phoring is a primitive portood system
telling send user the sistus of other users
and flas. The intent of this system is to

prevent the intermixing, overwriting, and resizing of files by the operating system of a single user. However, it doesn't always

work.

The safest operating procedure to use with today's disk-sharing networks is to copy files from another work space and use the copy in your own area. A system designed for multiple users accessing shared data files may actually keep many copies of those files for individual users.

copies or those neis to individual users.

If you fall into the grey area of users who need executive support and electronic mail capabilities, you should look at your database access needs to see if they fit the criteria of frequent access to changing data. This might help you decide between using the common PC LANs and other systems.

The Market

If you are an IBM PC user you can divide the LAN industry into two groups: those that have systems designed specifically for the IBM PC and those offering systems designed for any serial device. The latter group includes the digital pri-

Product Information

The following local area network systems for the PC are mentioned in this article.

Omninet Corvus Systems, Inc. 2029 O'Toole Ave. San Jose, CA 95131

(408)946-7700 CIRCLE 663 ON READER SERVICE CARD PCnet

Orchid Technology 497 Sinclair Frontage Rd. Milpitas, CA 95035 (408)942-8660

CIRCLE 682 ON READER SERVICE CARD EtherLink 3Com Corporation

1390 Shorehird Way Mountain View, CA 94043 (415)961-9602

CIRCLE 681 ON READER SERVICE CARD Plan 4000 Network Nestar Systems Inc.

2585 E. Beyshore Rd. Pelo Alto, CA 94303 (415)493-2223

CIRCLE 600 ON READER SERVICE CARD ShoreNet

Novell Date Systems 1170 North Industrial Park Dr. Orem, UT 84057

(801)226-8202 CIRCLE 679 ON READER SERVICE CARD

vate automatic branch exchange (PABX) telephone systems capable of carrying voice and data. It also includes systems using stand-alone and specialized devices

DPECIFIC portions of the hard disk must be formatted especially for each class

to interface a typical serial terminal with the data bus. You can, with some care and advice, use your PC on these systems and exchange data files with "foreign" devices. This is the thrust of the large commercial LAN industry. But most of the action in the microcomputer industry seems to be with products customized for the IBM PC, so let's look at them and see what is offered

PC-Specific Networks

Generally the IBM PC products allow individual systems to share a hard disk drive. The various system users can read and copy each other's files. Each individual user's system thinks it has its own dedicated hard disk.

These systems can host a mix of dissimilar users, but specific portions of the hard diek must be formetted especially for each class of users: IBM format for IBM users, Apple formet for Apple users, and so on. This means that IBM PC, Apples, and CP/M machines can often all operate on the same network; however, files can be shared only between like users.

Some LAN packages include special epplications software that can perform electronic mail functions. The vendors mey also include software allowing data to be buffered or "spooled" for faster access. Other companies are developing software designed to share files for executive support end electronic office functions. You need to look at every aspect of a prospective LAN-from the size of the wire and connectors, to the epplications software available for your configuration. Take nothing for granted because this is a new industry with plenty of holes yet to be filled. There are, however, some companies who are working hard to solve your problems.

Corvus

Corvus Systems claims to have more microcomputer LANs operating than any other vendor. Its Omninet system was a natural extension of its work on hard disk drives. The Corvus Omninet can host both IBM PC and Apple II microcomputers, but the data used by different types of mechines resides on different portions of the disk: it is not readable from one kind of mechine to the other

The media for the Corvus system is twisted-pair RS-422 cable. You can put 64 stations on the network and have e maximum distance between the stations of 4.000 feet.

The transport card that is inserted into the PC contains its own Z-80 microprocessor card and network interface software. Transporter cards are needed for each node. Each transporter card for IBM end Apple systems costs \$495

The Corvus disk is e stand-alone unit that includes a transporter card, disk support hardware, power supply and fan, and the disk itself. The prices for the disk unit range from \$2,295 for a 5.9-megabyte hard disk to \$4,295 for an 18.4-megabyte system. Multiple disks can be used on the network

Orchid

Orchid Technology has been shipping its PCnet for the IBM PC since November 1982, and it claims to heve over 1,400 interconnect cards in the field. The system offers two major features: the ability to use a wide variety of hard-disk drives and the ability to share the disk on an IBM PC-XT. The disk sharing on the XT is done as a background task. This means that the XT's operator normally is not aware that the machine is serving as a host.

If you own an XT and a standerd PC. you can buy e starter kit from Orchid for \$1,495 that includes the two PCnet adepter cards, the software, and 20 feet of coaxial cable. Additional PCnet adapters cost \$695. Up to 200 stations can be attached to this coaxial cable system over e maximum distance of 7,000 feet.

3Com

The 3Com EtherLink system was described in denth in PC. Volume 1 Number SAY SOMETHING COMPUTER

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This system uses the Ethernet protocol being nushed by Xerox, DEC, and Intal.

The IBM PC adapters for this coaxial cable system sell for \$950. The EtherShare O-megabyte hard disk system sells for \$11,500. Various electronic mail and resource sharing software packages are available.

The network can consist of as few as

two IBM PCs connected together for file swapping with EtherLink interface boards. This system can grow to connect to mainframe computers and over 1000 network stations.

Nestar

Netar's Pfnn 4000 was also described in PC-Volume 7 Number 9. This system is one of the most complete local area survivates on the markal. It has software packages providing implamentation of all of the International Standards Organisa Grandards of Capacina (ISO) model protocols. Natate uses the Areast token-passing protocol developed by Batapoint and later adopted by Tama'd by the high end TRS-80 system of TRS-80 system is the higher level protocols follow the guidelines of the Narro-Network Systems.

A Plan 4000 interface board for the IBM PC costs \$595. These boards must be used with a central file server. A typical centralized file server for a Plan 4000 network is a 60-megabyte driva with tape backup, costing \$22,500.

Plan 4000 is designed for hig users who want to combina IBM, Tandy, and Apple computers on single network. It can sup-

the PCs. to large accounts.

port 255 users on each system segment and various segments can talk together. IBM recently designated Nestar as an approved value-addad dealar for the IBM PC systems. This means that Nestar can sell complete LAN packages, including

Novell

Novell Data Systams is entering the BIM PC LAN market with two different approaches. Its first approach is to feature a file severe using a 85000 microprocessor that does the actual job of maintaining the disk directory files. This approach aliminates the problems encountered when individual operating systems address the disk directly. This true approach, with a file severe, does allow dissimilar systams of the severe, does allow dissimilar systams to the severe of the severe of the severe of the true severe of the severe of the severe of the true severe of the severe of the severe of the true severe of the severe that the severe of the

byte drive costs about \$14,000.

As an alternative. Novell is introducing a system using an IBM PC-XT as the file server. This file server will not move data as quickly as the 68000-based system. but the system costs about half as much.

According to Craig Burton, the product marketing manager for ShareNet, Novell's goal is to provide for complete data transportability between common microcomputer systems. It presently has software available to support a mix of IBM PC and Victor 9000 systems. Novell expect to have finished software available for other common MS-DOS and CP/M machines in the next few months.

The Future of LANs

The path of growth for microcomputer local area networks in the short term is clear. We will see more functional software being integrated into the networks to do things like electronic mail, office automation, and executive support. Tecmar is moving to combine a lower level Ethernet protocol with higher level functional software. (See "ComNet for the PC" in this issue.) We will also see more systems with the ability to share data files between dissimilar meers

Companies such as Corvus and Nestar will continue to improve the capabilities of their systems to communicate with external networks, such as IBM's SNA and the international X.25 protocol.

The big question is, however, what will IBM do? IBM has the power to drive the industry and to force many of the present vendors to adapt or die.

The present market contains some mature and capable networking tools, but if you don't see a natwork you feel you can grow with, then carry floppy disks

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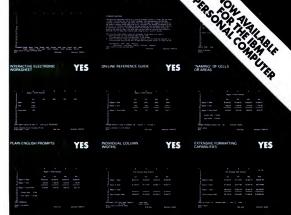
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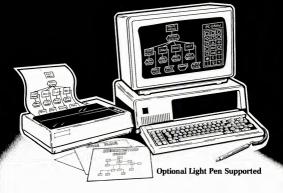
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machinery itself. The other is the "software," which tells a computer what to do, the way a driver tells a car what to do.

Without software, a computer can't do anything. And vice versa. You have to buy both.

Buy the software first.

computer is to get the capability the software gives you (remember it's the software that tells the computer what to do), it makes good sense to pick the software first.

Start by making a list of the things you want the computer to do Possibilities include word processing, inventory control, accounting, graphics, recordkeeping-you name it, there's probably software that does it.

Next take your list into a computer store and ask the salesperson to demonstrate software that will do the things you want.

Even though you'll need a computer for the demonstration, keep in mind the computer is just a vehicle. The software is the driver. Once you've decided on software, picking the rest of the computer system will be that much easier.

The simpler the better.

Some people will tell you that software has to be complicated to be powerful. Nothing could be further from the truth.

Good personal software should be, as the computer people say, "friendly." Meaning that it helps you do what you want to do without getting in the way.

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selective as you want.

tool that works with FILE. REPORT sorts through your files and retrieves the information you're looking for. Then assembles it all into one report, so you can analyze,

plan and make better-informed decisions REPORT is also good at math. It quickly sorts through columns of numbers and performs calculations, so you won't have to.

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graph

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Mscro and Math features simplify data processing. FormManager's built-in math capability provides

FormManager's built-in math capability provides 26 general math functions beyond the usual four arithmetic functions. You can define multiple formulas for Interactive calculation (as in your spreadsheet programs). Its macro facility includes repetitive (\$DO) and conditional (\$IF) statements. You can easily set up a task such as:

IF state = "CA" then TAX = sub total * 0.065



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NETWORKS/WINN L. ROSCH

Tecmar's new computer network can connect two PCs on the same floor or 200 PCs around the world.

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Ask any industry soothsaver to sey his

sooth and he'll likely explein that the future of personal computing lies in networking. His prognostication should be no surprise. In todey's fest chenging world of personal computers, it seems that if you turn your back for an instant, another network will crystallize from silicon, ready to catch your computer in its web

Given the lusb profusion of local area networks (LANs), the arrival of any new system may seem worthy of nothing more than the fanfare normelly eccorded to the sprouting of another dendelion. To stand out amid the ever-growing numbers of LANs, a new networking scheme has to be something really different.

ComNet is. Certainly it shares the besic precent of networking-linking computers together. But its prefix is the most important part of its name. You might expect Com to stend for Computer. Actually, it's a diminutive of Communico-

The extent of its communication abilities is the key to the difference between ComNet and other personal computer networks. Instead of offering just another

method of connecting two or three IBM PCs to eech other, ComNet's creator, Tecmar, has taken the essence of networking-letting computers and their eccessories talk freely to one another-and expanded on it. ComNet nushes the endpoints of the computer network out further than ever before, to include not only PCs but their operators. And it stretches the reech of e system from stetions within e single building to a network that connects continents.

Many of the capabilities designed into ComNet hint at what can be expected when all the personal computers in the world finelly wise up and band together. Yet es advanced as it mey seem and as much a pert of the future es it is, when the ComNet system is dissected there's noth-



The first board ComNet made in developing the system (left), and the slimmed down final version (right).

ing really new. Rather it's an Imaginative packaging of existing technologies into a single system. The future it points to is a single system. The future it points to is a synthesis of many divergent branches of personal computing, including networks. (Behrent), a modern, voice and video communication, recording and recognition, and even a mouse. With ComNet, all of these concepts and technologies fit inside on otherwise ordinary IBM PC chassis, held together by a glue celled softwere.

The Promise of ComNet

As you night expect, much of Combet works like any other local area network. Files can be sent from any computer in the network to eny other machine. Information can be drawn from a central data bank. Any computer or work station in the system draws its thoughts on a single (probably expensive) plotter or highspeed printer. Passwords protect sensitive hist from prying eyes. The ability to keep hist from prying eyes. The ability to keep a computer system with the lightest security specifications.

But the network capabilities of Comnet don't stop with computer data. Voice digitation turns spoken words into a digitation turns spoken words into a distin equivalent that can be handled by a PC as if it were a data file. As digital pulses, a cas let stored in the same disk memory system with other life. In fect, voice input and data can be mixed freely, so you can prapare a document along with an oral expleration—end store both together. No expleration—end store both together. No preserves the computer of the comtraction of the computer of the comsequence of the computer of the computer of the computer of the comtant of the comtand of the comtant of the comtant of the comtant of the com-

More then that, you can mail e document electronically, complete with playby-play or clause-by-clause explanations. anywhere in the network or enywhere a telephone signal can reach-which meens anywhere in the world. The builtin ComNet modem transfers anything on the network line to a bigger network, the worldwide telephone system. With the telephone connection, your PC can do double, triple, or quedruple duty es a telephone answering machine, eutometic dialer, and e dial digit monitor to give a printout of all the calls you or your PC have made. You can use a Touch Tone keypad on any telephone as a remote control to operate your PC and whatever is connected to it-even your entire business—from e thousand miles eway. Additional features allow you to speak commands to your computer, move the onscreen cursor with a mouse, or control a dictation machine with e foot nedel.

Yet all ComNet functions are programmed into your PC es background tasks. While you're slaving awey et 1-2-3 solving business problems, your computer can be chatting with your former book-keeper at his eather in Revail

ComNet is sold in three versions: the Secretary, the Maneger, and the Execu-

THE SOFTWARE acts as a combination conductor and traffic cop.

tive, each with successively greeter capabilities. All three consist of several expension boards thet plug directly into the IBM PC expansion slots and the necessary software to make the hardware useful.

Tecmar advises at least 256K RAM to use ComNet effectively. This amount actually allows at least 110K RAM to be free et ell times, which, according to senior software engineer Erich Ringewald, is the greatest amount of RAM used by any surpersm he's encountered.

You'll want to have et least one hard disk drive, for reasons that will become epparent later. Floppy drives are unnecessary, according to Tecmar. The softwere is designed so that the system can boot without e floppy. However, no one explained to me how you get programs in and out of the system without a floppy disk drive!

A system requires at least two and probably dozens of PCs to take full advantage of all of ComNet's capabilities. Although ComNet is based on Ribernet bardware, the ComNet system may not be systems. Pull implementation of all the ComNet setures requires installation of comNet in every PC in the network. Each of the different ComNet everions consists of a combination of expansion boards and of a combination of expansion boards and mine the ComNet features of each individual PC in the system.

The Ethernet Board

No computer is an island-or at leest no computer should be an island. This simple concept underlies the philosophy of networking. Put simply, networking means linking together several devices electronically so that they can ell share the same information. The electronic gear need not be computers; it can include mere data terminals, printers, and mass storage devices. The shered information can be anything in the digital form that is reedily digestible by the equipment. Files can be sent from terminal to terminal. many terminals can access the same detabese, or several computers can share the seme printer.

The essence of networking is that the whole is greater than the sum of its parts. A network can save in hardwere costs when expensive peripherels ere shared between computers; it can save time when large blocks of fast mass storage are continuously on-line, end on which data from a number of machines can be compiled instantly; and it obviates the necessity of storing the same information in every computer in a business.

Networking combines bardware with the softwere that links everything together. The hardware is more than just connection wires. It's elso the circuitry that converts the computer's internal signals into a form thet can be translated. The software controls the hardware and acts as a combination conductor and traffic cop to make sure that everything gets to the right place and that there are no orguments between the connected units.

Tecmar adopted the Ethernet hardware standard as the basis for its Combet system. Rather than try to create e new standard. Tecmar chose to use an industry standard. Ethernet is primarily chempioned by respected names like Xerox, Digital Equipment Corporation (DEC), end intel. Of course, on the practical side, its close lot cheeper to use en existing system than to invest millions in developing e new one.

Despite the fact that Ethernet tends to be the most expensive of the currentlyused standard networks to implement. Tecmar chose it from emong other recognized standards (essentielly Arcnet and Omninel) because of its high-speed copebilities. Ethernet operates et 10 megahertz (MHz. or millions of bits of data per second) compared to Arcnet' 22.5 MHz. end Omninet's roughly 1 MHz. Whet's more, as Ethernat gains populerity, its cost should fall, particularly sinca most of tha system is now conteined on a single silicon chip.

High speed seems like a good idea until you realize that the Bish PG doesn't think at enzywhere near the speed of Ethernet. "Send an Bish PC e 10 Mizz Ethernet burst, and it will sit there ell day trying to ligare it out." node Ringewidt. In much of gigner it out." node Ringewidt. In much of e difference when few PCz are skotted together. In en Ethernet system the computers thansaelvas are the slowest part of the system. Using Roppy disk driven further slowes the PC. one reason divides the proposed of the proposed of the proposed between the proposed of the proposed of the proposed of the beautiful to Committee the proposed of the proposed of the beautiful to Committee the proposed of the proposed of the beautiful to Committee the proposed of the proposed of the beautiful to Committee the proposed of the proposed of the beautiful to Committee the proposed of the pro

When a network expands, however, speed becomes importent because ell the computers end ell the peripherals must communicate over one wire, and the network rules (end common sense) prohibition more than ona device from communicating et et time. Because Ethernet (and hanca ComNet) is designed to handle up to 1024 separate computers and peripherals. "modes"—speed is very important.

Each Ethernet or ComNet system uses e coaxial cable to carry the conversations between nodes. In connecting the system, this special cable must be run to every computer in the system. Regular telephone ceble will not work at Ethernet speeds.

IN AN ETHERNET system the computers themselves are the slowest part of the system.

The Ethernet Companion Board

The voice communications capebilities of the ComNet system dapend on Tecmar's Ethernet Companion Board. Its most important function is voice digitization: changing analog voice signals (the type of signels used in stereo equipment) generated by e microphone into digital signals that can be handled by both a PC and the Ethernet systam. The digital processed voice informetion cen than be manipulated as a standard PC-DOS (or MS-DOS) data file.

Technically, the board uses delta modulation at a 32 kilobit per second sampling rate. To the user unvarsed in jargon, this meens thet the sound quelity of e recorded voice should be ebout es good es what you hear over the telaphone.

I was told that the Tecmar design goal is a bandwidth of from 300 to 4000 Hartz. slightly wider then that provided by normal telephone sarvice, end a signal-tonoise ratio of 30 decibels (dB). During a demonstration at the Tecmer office. I spoke to the digitizer and it echoed my voice, preserving all inflections, sounding more like a mediocre tape recorder than a computerized voice. My estimate of its record/playback signal-to-noise retio wes 20 dB. The engineers at Tecmar acknowledged my figure es ebout whet they hed ectually measured, but they countered by saving that production models would be "cleanar" and sound better. Even without the cleanup. I would label the quality as tolerebly intalligible and acceptable for

most business purposes. Delta moduletion meens only that the changes in sound from one sampling period to another are recorded, saving circuitry and the amount of storage space needed. Saving space is important because the digital trensletions of voice use up e lot of room. A little math is revealing: 32 kilobits per second means that storing one second of digitized voice takes eight kilobytes of memory. In other words, a single-sided floppy will hold roughly 45 seconds of gab, hardly enough to turn your PC into e dictating machine. You now know another reason why Tecmar does not recommend using floppies with Com-Nat. No doubt even e small hard disk, like the IBM Personel Computar XT's standard 10 Megebyte, hes more than enough room for comments on contracts end the like. Even so, e little talk can take big bites out of the Winchester.

For dictation, end other langthy massege recording, however, the Ehernet Companion Board elso provides a microcassette recordar controller for a Paaricorder SX-Q2. Expleined Ringeweld, "It's the only one we've found on the market with remote control capabilities end good sound quality."

To belo with dictation, the Ethernet Companion Board also provides a foot pedel thet, typically, can be used to control the Pearlcorder. When used in the ComNet system, a foot pedal allows for some interesting programming possibili-

A SINGLE-SIDED floppy will hold roughly 45 seconds of gab.

ties. Because the PC can detect the silence between words, the cassette recorder can be programmed to pley ten or any convenient number of words then stop, so thet a secretary taking the dictetion can catch up. A tep at the pedal brings enother ten words. Or the pedal can be programmed to act as a "dead men's padal"-the recorder will run only while the padal is pressed. The Ethernet Compenion Board comes equipped with the circuitry to control a mouse so thet there's no need to stuff enother board into the PC when new software requires the addition of a mouse to the system. A mouse will not, however, be part of the initial ComNet offering, according to Tecmar president Martin A. Alpert.

Modem Board

To extend the reach of ComNet from within a single facility to the outside world, e modem on e plug-in expension board is optionally supplied (standerd in the ComNet Manager and Executive systems). Both 300 board (Ball 103) and 300/1200 board (Bell 212A) modem cards are available.

The modern cards can perform all the functions of a typical external modernand then some. The modern allows the PC to send end receive data through standard telephone circuits from anywhere in the world. (Yes, if you vanied to, you could send digitized voice files through the modern, but because of the digital conversion, you'd actually get about te tenth is extended to the control of the performance of the control of the performance of the perfo

information in your computer or to control its functions

Combining the modem and voice digitizing features, you cen turn your PC into the world's most advanced telephone enswering machine. Not only will it play and record messages, it cen play different messages at different times, end can play special messages to particular people. Typically they would use their own telephone keypads to eccess their personel messages.

The modem board, and hence, your PC. is connected between your telephone and its lack. You plug the PC into the lack and your telephone into the PC. In case of a power failure, or when you turn your PC off, a feilsefe reley on the modem directly connects the telephone to its lack so thet your telephone will function normelly. Although e separete microphone and speaker can be used with the ComNet system, the telephone handset can provide both functions.

Voice Recognition Board

The Executive ComNet system differs from its lesser siblings in that it includes e Volce Recognition Board that enables your PC to heer end react to whet you say. The Tecmar varsion of voice recognition has a standard vocabulary capecity of 100 words, which can optionally be increased to 200 by adding more RAM chips.

The board has no stenderd or built-in vocabulary: rather, you train the system to recognize any words you went es single keystrokes, combinations of them, or es complate commands. Although recognizing numbers by their English names presents no problems to the system, the letters of the elphabet sound so much alike thet your ComNet-equipped PC might think them indistinguishable. Should you need to spell things out for your computer, however, you can teach it to understand en unambiguous elphebet such as the one used by pilots end oldtime radiomen:-"alpha," "bravo," "charlie," and so on. The engineers at Tecmar recommend teaching your computer to understand the basic PC-DOS commands, like Return, Directory, Type, and Chkdsk.

Note that the Tecmer voice recognition system is not "speaker independent." It will recognize your voice and probably that of no one else. If it is "treined" using a high quelity microphone, it may not recognize your voice over the telephone

Training is a simple procedure. You tell your computer whet you want the spoken instructions to meen by typing the instructions in. The monitor screen then prompts you to say one word efter enother into a microphone so that the computer can learn what your voice sounds like for

LF YOU'VE trained your PC to recognize your voice over the telephone, you can command it from anywhere in the world bu voice command.

each word. For best results, the training list should be repeeted five or six times. When you ere finished, the results are amazing. The microphone becomes an extension of the keyboard (a "transparent keyboard," one compeny calls it), and it elicits the proper commands no matter whet program you ere running. Every time you say "return." for instance, the computer registers a carriage return as if the

Return key had been struck. Voice recognition is not just for the chronically lezy or those too temperamental to type. In most cases, this technology will supplement rather then eliminate normal kayboard entry. It can help those who cannot use a keyboard (for instance, the handicapped) or those who cannot get to a keyboard. If you've trained your PC to recognize

your voice over the telephone, you can command it from enywhere in the world by voice command.

Networking Video

Besides digitized voice, ComNat can hendle digitized video from Tecmar's monochrome Video Van Goeh expansion board, which translates the imega from a television camere into a digital picture with a resolution of 256 by 256 pixels and 256 levels of grey. The result is not e moving-image television picture. The IBM PC and Video Ven Gogh combination is not a particularly speedy video digitizer. Recording e single freme snepshot requires about 6 seconds.

The resulting picture is handled by both computer end ComNet as regular deta; it can be reproduced (in 16 levels of gray, although all 256 levels are stored) on any monitor that uses an appropriete graphics interface board in the ComNet system. Even at Ethernet's high 10 MHz. speed, transmitting e complete picture within the system still takes about one second. A digitized picture can elso be sent-albeit very, very slowly-over a standard telephone line using the ComNet modem.

Spanshot video does have its uses. It can identify parts on en essembly line or signetures on documents. With proper software, it can become a security system, detecting any change in e patrolled area end immediately notifying the proper authorities, using ComNet, of course.

Using the System

Networking and ComNet are definitely not for everyone. The bigh speed advantages of Ethernet don't become apparent until numerous PCs share the same network. The exect number depends on bow heavily the network is used. Systems from three or four to 200 work stations are practical, eccording to Tecmar engineers. Other networking systems exist, though none have ell the extre features of ComNet. Even the high speed of Ethernet can be bought by itself elsewhere-from 3Com. for one-cheaper.

The only shortcoming in the ComNet system seems to be that its capabilities are growing fastar than available memory. Voice and video digitization both swellow huge chunks of memory. Little wonder Tecmar is readying larger and larger Win-

Otherwise it is difficult to fault the ComNet system. The demonstrations of prototypes I saw all work as advertised. And the company promises that ComNet can only get better. In-use tests began in lune, and improvements (or corrections) uncovered will be incorporated in the commercial units starting in August. In fect. Tecmar promises to supply at no charge (until next year) eny updates develoned after ComNet systems are delivered. Later updates will be available to users of installed systems under e software service contract. /PC

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BOOK EXCERPT/FRANK J. DERFLER, JR. AND WILLIAM STALLINGS

This book explains the equipment, techniques, and standards that are involved in linking personal computers into a local area network. The following excerpts are from chapters 4 and 6.

Local Networks: A Guide For The Perplexed

A Monoger's Guide to Local Networks Frank J. Derfler, Jr. end Williem Stallings; Prentice-Hell, Inc., Englewood Cliffs, NI 07632: 153 pages, \$14.95 softbound; ISBN 0-13-549758-2

Copyright 1983 by Prentice-Hall, Inc. CIRCLE 677 ON READER SERVICE CARD

Connections and Standards

If you are going to make sense out of the various local networking plans, you need to know something ebout how they hook together and what the strengths and weaknesses of their connection schemes are. In this chapter, we will examine several methods of connecting stations together on a local network.

Media

When local network people talk about

the medie, they don't meen the newspepers and television. Instead they mean the various kinds of transmission media that

 $T_{\scriptscriptstyle ext{ iny HE MEDIA}}$ should be as reliable, easy to install, easy to maintain, and easy to reconfigure as possible.

are used to hook together the equipment connected on a local network. The most commonly used medie are coaxial cable. twisted-wire peirs, and fiber-optic light-

The media used to connect a local network should be as relieble, easy to install, easy to meintain, and easy to reconfigure as possible. In the long run, these consideretions might outweigh such factors as somewhet higher initiel costs for meteriels or maximum-transmissionspeed characteristics. The disruptions caused by reinstallation, update, and repair of some media are very good arguments for doing things right the first time

Most networks currently in use transmit messages over either coaxial cable or twisted peirs of wires. Fiber-optic systems capable of performing very well in specific applications are being offered by severel manufacturers.

Twisted Pairs

A twisted pair of copper wires is the

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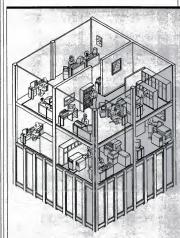
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simplest form of connection found in modern networks. It is normally easy to mistall, move, or add to. The cost depends can be roused internally to the building can be provided by the building can be considered by the building can be considere

speeds of up to 1 megabit per second over a distance of about 1 kilometer. The signal as a reposter, which regenerate the signal and retransmits it, but the cost of the repeaters can offents the original tow cost of the wiring if the data are to be sent any appreciable distance. Remember, the distance to be measured is the actual path of the wire, not a stright lime between two merely sping around a standard doorway.



A bus-type transmission medium can serve many different offices. This cable bus could be either coaxial or fiber-optic. (Diagram courtesy of Xerox Corporation. All rights reserved.)

noise from the environment it possess through. As described earlier, the digital signels are very short in length, and eny pulses of electrical noise can result in serious data is out. Twisted pairs abould not be assumed to the serious data is out. Twisted pairs abould not be assumed to the serious data specifically assumed to the serious data seri

If Industrial security is a consideration, twisted-pair wires ere a poor choice unless they are enclosed in e protected wire-distribution conduit. Even then, the high-speed signals may actually be radiated by the wires and can be received by sophisticated means some distance from the wires without any physical contect.

Coaxial Cables

The other commonly used form of connection is coaxial cable. "Co-ax" is usually mede up of one heavy center conductor surrounded by an insulating layer of plastic or plastic foam. A metallic sheath (either braided copper or solid aluminum) is pleced over the plastic. The inner conductor and the sheath then share the same common geometric axis and therefore are coaxial to each other (hence the neme). The outer sheath is usuelly covered with another insuleted coating. Co-ax comes in standard sizes with outside diemeters of about 1/4-, 1/4-, 1/4-, end 1/4-inches. The size of the co-ax, the type of insuletion, and the type of sheeth determine how fast and how far signels can trevel over the cable.

Different types of coaxial cables are used et various points in a network. Trunk cables are used for long runs between buildings or remote equipment. These are the highest-quality cables, with foam insulation and solid eluminum outer sheeths.

Distribution or feeder cobles take signals close to the equipment. These are smaller cables, but probeby still have solid sheeths. Drop cables provide the final link to the equipment end between equipment in e local area. Drop cables are the smallest and most flexible.

Co-ax is not cheep. Meteriel costs alone can easily run \$1 per foot. Installation can more than double the price. It isn't easy to install because (particularly in the larger size) It is feirly stiff and cannot make sharp bends. It is best installed in false flooring or ceilings, where it can be easily fed into position. Coaxiel cable does not require conduit for instellation and can be buried for runs between buildines. Coaxiel cable has e very wide bandwidth. The theoretical trensmission speed for coaxial cable is much higher then for twisted pairs. it can easily carry e 10-Mbps deta circuit end several channels of video plus meny voice conversetions et the seme time.

The shield on e coaxial cable gives it



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good resistence to the intrusion of noise. Co-ax is not completely noisefree, but it can provide good service in environments where unshielded wires could not function. It is particularly resistant to electromagnatic interference from sources like radio transmit-

Coaxiel cable provides improved industriel security over twisted-peir wires because it radietas less. It is, however, still assily tapped by anyona who cen gain physical access to the cable. Nothing has helped the popularity of

coaxial cable as much es the cable television (CATV) industry. The widespread use of CATV has created a ready supply of cable, parts, and connectors. It has created e pool of persons with knowledge of how cable systems should be instailed and maintained. Many buildings are now being wired for CATV during construction, end the axecutive looking for e local network can often find e very capable high-speed transmission medium elready behind

the walls.

Fiber-Optic Cable

Both coaxial cable and twisted pairs of wire require that care be taken to ensure that they svoid contact with inappropriate electrical grounds. They must also be routed around heavy manufacturing locations

TWISTED pair can travel for 15 feet merely going around a standard doorway.

or other sources of interfering noise. Fiber-optic cables do not have these drawbacks. Since fiber-optic cables are made of glass, they ere not troubled by the unequel electrical ground potentials often found in large buildings. Lightning end other inducad power surges are also not major considerations. Fiber optics have other advantages over copper wire and cables, including potentially lower costs, freedom from tapping and interception, freedom from radio interference, and the elimination of some forms of degradation that take place when electrical signals traval long distances in a conductor.

The potential transmission speed of

fiber-optic cables is even higher than that of coaxial cables. Practical fiber-optic systems that can operate at speeds of 20 Mbps over distances of up to 2 kilometers are on the market. The popularity of coaxial cable with CATV companies has probably slowed the development of fiber-optic systems. But CATV companies are elso interested in the technology for their heavy-use, short-run requirements, One of the most ambitious projects is installed in London, Ontario. This 322-Mbps system carries 12 color television chennels and 12 stereo chennels over 8 kilometers. The system electronics were built by Harris

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Corporation and the ten lengths of sixfiber cable were manufactured by Canstar.

FIBER
optics have freedom
from tapping and
interception.

Fiber-optic installations are still seen less frequently than coaxial-cable installations because of e leck of standardization in the industry end a lack of experience emong instellers and service organizations. Workers know how to hook up copper wire and co-ax, but coupling optical

fibers requires some specialized knowledge. Efficient coupling of the light anergy from fiber to fiber and from the fiber cable to the transmitter and receiver requires the use of special connectors and elignment techniques. The lasers and light-emitting diodes used to transmit light down e light pipe are still produced only in small quantities, so their prices are high. Still. fiber-

optic technology is rapidly joining with

cable and wire systems to deliver informa-

tion on some other medium than paper.

If you have every noisy environment, are particularly concarmed ebout security, or have very-high-speed data and video transmission requirements, you should consider fiber-optic cables as an interconnection method. Great potantial still exist in the field of fiber optics for development work. Some industries might consider e combination developmental and

operational fibar-optic system, which

would have unique long-term investment potential.

potentian:
Pairs of twisted wires, coaxial cables,
and fiber-optic cables sill have their own
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The Topology

The Topology
The topology of e system refers to the
wey units in a network are connected
together—the geometry of the system. Stations on e network can be strung out like
tops along a bus route, armapad in e
circle like the petals of a flower, or laid out like
the points of a star. In fact, those are
the three common weys of describe, the
popular of the system the star, the ling, the
topology and the star in fact, the ling, and

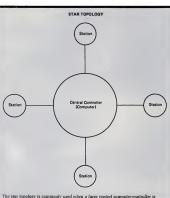
The Centralized Star Network

A star network consists of e central controlling device connacted by a point-

COUPLING
optical fibers requires
some specialized
knowledge.

to-point communications circuit to every other device on the natwork. This is the configuration commonly used to connect a large mainframe computer to its remote terminals. It also describes the leyout of most common PABX systems. This pattran permits good communications between the stutions on the network end a centrelized host. All communications between individuel terminals must pass through the host patterns and the patterns are the patterns and the patterns are the patterns and the patterns are the patterns are the patterns and the patterns are the pattern

This kind of system is particularly eppropriate whan the host contains all of the datebase to be shared or programs to be run. It is, however, e very vulnerable system, because when the host breaks down, all activity stops. A malfunction in tha



available to perform the functions of switching and controlling the flaw of traffic.

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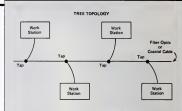
centralized host can disrupt communications between users who really have no need of the host's capabilities other than as a communications relay.

Centralized systems can usually be expanded easily, up to the limit of the central computer's capabilities. The cost to expand beyond that point may be high because it can involve the investment in large hardware packages. Centralized systems can allow easy access into one or costile communications systems. The control of the control of the cost of the the functions needed to exchange information with other local or national data networks. Centralized systems can also provide good physical and software secu-

PAIRS OF twisted wires, coaxial cables, and fiber-optic cables all have specific strengths and weaknesses.

rity. The cantral system can be monitored by a human operator who can screen the terminal users desiring access to cartain information.

If all of the davices on the system frequantly have to exchange a variaty of data among thamselves, the star can become cumbarsoma. The centralized computer becomes simply a massaga switch. It is probably not economical to operata and maintain a large centralized system just to sarve as a massage switch. In the star network each communications link is axclusively dedicated to the two devices it connacts. Whan these davices are not communicating, the axpensive communications link is idle. Even when the units are communicating, their data rates may be considerably less than the capacity of the link, particularly if one unit is a terminal and the other a computer. The throughput of a terminal to a computer is probably less than the typing spead of an average typist. It makes little sense to shoot these characters out at a spead of 1200 band or more when the total throughput is only 60 or 70 characters per minute in one direction.

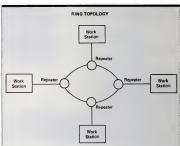


The tree topology hongs stations from a common coble bus like leaves from the limb of a tree. Failure of a coble top will not normally inhibit the operation of the entire system.

The Ring Network

The ring, loop, or doisy-choin topology arranges the stations of a network in a circle. One station on the network can be designated as a mastar to control the timing and transmissions of all the other units, or the units can have some sort of built-in

operational program that allows tham to enter into the system at idle times. In a ring network, a message may be relayed by soma stations on the network. All stations monitor all messages to see if any are addressed to tham. The ring natwork has greater equipment raliability, since it does



The ring tapology depends an active repeaters to relay information around the ring. Any of these repeaters could be a weak link in the system. Despite this, the ring tapology has gained acceptance with network developers in Europe. It is becaming more widely accepted in the United States.

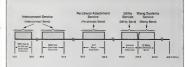
not require a central controller or reley point. However, failure of one relay point in the ring mey (depending upon the transmission arrangement used) helt the

EXPANSION of a ring network may involve software or hardware changes in every station.

complete message trensmission process.

Expansion of a ring network may be complex. It may involve some softwere or hardware chenges in every settion. Security in a ring network depends to e large degree on the physical security of the stations themselves.

Ring networks do not lend themselves well to the combination of different kinds of information (video, voice, end data) on the same system.



This illustrates the monner in which fraquencies ore ollocoted on the WongNet broadband local network. This broadband system has so much copocity that significant portions of the spectrum are not even ollocoted. (Diogram courtesy of Wong Laboratories. Inc. 1

The Tree or Bus Network A very common form of interconnec-

A very common form of micronnaction is the bus arrengement. One bus network the stetions ere etterched to e single (or perhaps dual) cauxial or fiber-optic coble. The stetions are ettached by devices called coble tops. The bus system sheres severel edventeges with the ring [1] It does not require e centralized controller. (2) It does not lallow sections of connecting medium to go idle, and (3) it cen economically handle short messages exchanged enough meny different stations. The bus connection scheme has the added edventage of being idle to perete effectively if one or more stations melliunction. Bus systems can be easily expanded and modified to exchange dete with other networks. The security of e bus system is dependent to a lerge degree on the physical security of the stations on the system.

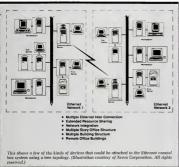
Bus systems eesily lend themselves to the combination of video, deta, end voice information on the seme system.

Multiple-Access Techniques

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IN A RING network, all stations monitor all messages to see if any are addressed to them.

Some of the rules we follow are very clear; others depend on meny factors that may or may not be operating at the moment. Similerly, stetions sharing the seme network for the transmission and receipt of infor-



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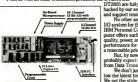
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metion have rules governing how they transmit end receive dete. These rules allow multiple users to have access to the information network medium.

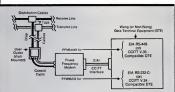
Traffic or highways can be divided according to their time or space. Socilipher regulate traffic eccording to time. Complex switching systems can control several lanes of traffic. Lane markers divided traffic eccording to space. In some cases lanes are firmly setablished and into their they are more flexible. Similarly, the traffic on an information-movement system can be divided according to time and the electrical equivalent of space: frequency.

Time Sharing

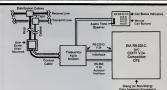
There are several weys in which network stations can share the time evailable on a system. These include polling, reservetion, and contention schemes. Methods of allowing many stations to shere the

CONTENTION schemes operate like automobiles at a fourway ston.

same communications network by regulating the time slots in which they can transmit are called time-division multiple-access (TDMA) techniques.



A frequency-agile RF modem is copoble of moving to different channels in a braadband network. In effect, it operates in different subnetworks within the total network. (Diagran courtesy of Wong Laboratories, Inc.)



A fixed-frequency RF modern can be used when a device needs to operate on only one channel assignment in the total spectrum of a broadbond local network. (Diagram courtesy of Wong Laboratories, Inc.)

Master-Controlled Methods

Polling is a method of operation found in systems with a master network controller. These are normally large computers of the state configuration. A polling scheme operaties like a good vester in a good vester in a communication server ill actually used in the industry] constantly glences et the customers to see if any need service. When they signed their desires, the server provides channel of communications. In the measurine, the system keeps lossy with the measurine, the system keeps busy with the measurement of the measurement of the system keeps and the measurement of the system keeps and the system keeps are successed to the measurement of the system keeps and the system keeps are successed to the system keeps and the system keeps are successed to the system keeps and the system keeps are successed to the system of the system keeps and the system of the system keeps and when the system is system of the syst

Reservation schemes operate, as you might assume, according to a preset schedule. The scheduled transmission time for each stetion on the network might occur many times a second. If the channel is busy when e station's reservetion comes

up, the station on the channel will retain priority. Various arrangements prevent stations from making exclusive use of the channel. Reservetion schemes usually use a mester controller, but this is not an absolute requirement if all stetions know exactly what time it is end whet the reservetion schedule is.

Waiting for the Bus

A method of multiple occess known as contention is the most widely used on bus-configured networks. Contention schemes operate like seutmobiles et a four-way stop. The driver arriving at the four-way stop. The driver arriving at the work of the second se

Rules allow multiple users to have access to the information network medium.

We use four-way stop signs at intersections because they ere cheeper then stoplights end other forms of controlled access and because they provide an even flow of traffic even if it errives et the Intersection at irregular intervals end in Irregular clumps. Stoplights divide the time between roads, but all roads might not heve the same emount of traffic. A smart traffic cop could respond to the chenging treffic conditions but would be an expensive weste of resources during itellet times.

Similarly, the contention scheme has the advantage of being relatively simple yet oble to respond to changing traffic patterns on e system. Most bus networks use a contention scheme called corrier-sense multiple occess with collision detection

(CSMA/CD). Two simple rules of courtesy are used by stelions operating on a CSMA/CD contention network: [1] Traffic already in the channel hes priority. If a station is trunsmitting, old other stelions just listen. Stelions on the network determine if the channel is busy by listening for the redio frequency signal or carrier from enother stelion (the "carrier-sense" portion of

Section (time Carrier-sense portion of the CSMA/CD). This technique is really not the much more complex than the squelch feature on a citizen's bend radio or mobile telephone. (2) if the chennel is clear (or owhen the chennel clears), eny station may from the chennel clears), eny station may from the chennel clears), eny station may from the chennel clears).

proceed to trensmit. If two stetions decide to trensmit e message et about the same time, they may detect a garbale or collision with enother message. The effected stetions then cut short their transmission end weit a period of time before ettempting e retransmission. This is the collision-detection feature of CSMA/CD.

This second rule has a special feature that insures that each stetion wells a period of time set specifically in its progrem. This time veries according to the number of feilures it has experienced (kind of a frustration level!). This assures that two

Glossary of Local Network Terms

This glossary presents technical and operational words that appear in discussions about local networks.

access method—This is an IBM term with a precise meaning. It refers to specific kinds of communications software which includes some protocols for exchanging dats, constructing files, and other functions. This term is used in the local pos-

includes some protocols for exchanging data, constructing files, and other functions. This term is used in the local network context to refer to the method of determining which device has access to the transmission medium at any Instant. CSMA/CD is an example of an accessmethod.

ACK—A positive acknowledgment control character. This character is exchanged between system components when data have been received without error. This control character is also used as an affirmative response for setting up a communications exchange.

Advanced Communications Function— An IBM program package to allow sharing of computer resources through communications links. Supports SNA.

ANSI—American National Standards Institute. Develops and publishes standards for codes, alphabets, and signaling schemes.

application layer—The seventh (top) leyer of the OSI architecture. Not described in detail by the architecture. This layer determines the interface of the device with the user.

ASCII—American Standard Code for Information Exchange. More correctly known as USASCII because of some change in recent versions. A method of coding digital signals. The ASCII character contains seven bits: an eighth parity bit

asynchronous—A method of transmission in which the time intervals between characters are not required to be equal. Start and stop bits are added to coordinate

the transfer of characters.

background program—A program that
performs its functions while the operator
is working with a second, different pro-

performs its functions while the operator is working with e second, different program. Communications programs often operate in the background mode on word processors. They can receive messages while the operator is processing words. The messages are stored for leter display.

bandwidth—The range of frequencies a circuit will pass. Analog circuit ytyically have a bandwidth limited to thet of the human voice febout 3 Kifz. The square waves of digital signals can be distorted by inadequate bandwidth. The faster the digital signal transmission rate, the greater the bandwidth requirement. Piber-optic and broadband cables have excellent bendwidth.

baseband—Transmission of signals without modulation. In a baseband local network, digital signals (1s and 0s) are inserted directly onto the cable as voltage pulses. The entire bandwidth of the cable is consumed by the signal. This scheme does not ellow frequency division multiplexing.

baud—A measure of transmission speed. The reciprocal of the time duration of the shortest signal element in a transmission. In RS-232-C ASCII, the signaling element is one bit.

bisync—Binery Synchronous protocol. An IBM byte-oriented, link-leyer communications protocol that is widely used. They are trying to replace it with SDLC. block—A number of characters transmit-

ted as a group.

hps-Bits per second.

bps—Bits per second.
broadband—A term used to refer to trans-

mission media capable of pessing videundwidth signels. Usually classed as capable of dete speeds of 15.2 Ktps or greater. In the local-network control broadband refers to the use of frequencymultiplexed cable. Digital signals are passed through a modem and transmitted over one of the frequency bands of the cable.

BSC-see bisync.

bus—A transmission medium, usually coaxial or fiber-optic cable. This term is usually essocieted with networks in the tree topology.

carrier—1. A radio frequency or lightwave that is transmitted over cable and modulated with e signal. 2. A company that provides transmission services. See common carrier. CATV—Community-antenna television.

Based on broadband coaxial-cable technology.

CBX—Computer branch exchange. A type of PABX. See PABX.

CCITT—Consultative Committee of International Telephone and Telegraph. A committee of the United Netions that develops and publishes international stations that have collided will not collide again and that one station with the shortest wait time will not monopolize the

CSNA/CD is a very efficient technique. Xerox has proven the system in various operating programs. Published results show that on a network with 120 stations openting under a normal load, stations succeeded in sending their message the first time in over 99 percent of their tries. Stations had to cut their transmissions short and try again only about 0.8 percent of the time. Figures like these seem to show that collision detection may not be needed in the great majority of transmission attempts, Indeed, some bas networks do not use the collision-electron feature (they the collision-electron feature (they the collision-electron feature (they the collision-electron feature (they when it has a message, if it does not receive an acknowledgment of its message, it retransmits the message until it is does. This system is really more efficient than it seems because of the internitional allows the software and ensimposent to be less complex and allows other manufacturers to avoid the payment of royalties to Xerox for the use of the patented collisiondetection techniques.

Catching the Ring

Two sharing schemes are used in ring networks. Both techniques involve passing a signal around and around the ring, either carrying a message or indicating that the network is clear. The first technique is called slotted ring. In a slotted ring network, a message called a frome is passed from station to station. The frame

standards.

channel—A communications path. A channel may be a physical link or a logical path described between two communicating units.

circuit switching—A method of communicating in which a dedicated communications path is established between two devices, bandwidth is guaranteed, and delay is essentially limited to propagation time. The telephone system uses circuit

switching.

coaxial cable—An electrical-transmission cable with a center conductor and an outer electrical shield. Used in both broadband and baseband systems. Broadband cable has better shielding than baseband cable.

common carrier—A transmission company (such as the telephone company) that serves the general public.

communications controller—A programmable computer "front end" in the IBM SNA network

contention—The condition when two stations attempt to use the same channel at the same time

control character—A character used for special signaling. Often not printed or displayed, but causing special functions such as the movement of paper in a printer, the blanking of a display screen, or "handshaking" between communicating de-

vices to control the flow of data. cps—Characters per second.

CRC—Cyclic redundancy check.

cross-talk—The spillover of a signal from
one channel to another. In data
communications it is very disruptive.
Usually, careful adjustment of the circuits
will eliminate cross-talk.

CSMA/CD—Carrier-sense multiple-access collision detection. A network-access collision detection and exhertened technique by means of which stations sense the absence of a carrier on the meditum and begin to transmit. If two stations una manufactum and begin to transmit if two stations and cease transmitting. Each waits a period of time determined by special noninterference techniques before initiating transmission again.

current loop—An electrical interface that sensitive to current changes rather than voltage swings. Used with older (often Baudot-encoded) teleprinter equipment. cyclic redundancy check—(CRC). An unnerie value derived from the bits in a message. The transmitting station uses one of several formula to produce a number that is attached to the message. The receiving station applies the same formula and station applies the same formula and numbers are not the same, an error condition is declared.

Data Access Protocol—A specialized protocol used by Digital Equipment Corporation.

data-flow control—A communications layer in SNA that creates and responds to outgoing and incoming messages. data-link control—A communications

layer in SNA that manages the physical data circuits. data-link layer—See link layer. DB-25—The designation of a standard

DB-25—The designation of a standard plug-and-jack set used in RS-232-C wiring: twenty-five pin connectors, thirteen pins in the top row and twelve in the bot-

tom row.

DCE—Data communications equipment.

A common designation for communications equipment such as computers and

modems. Uses a female DB-25 chassis

delay—In addition to the common meaning of a pause in activity, delay can also be a kind of distortion on a communications circuit. Delay is the property of an electrical circuit which slows down and distorts high-frequency signals. Devices called equalizers slow down the lower frequencies and "equalize" the signal.

distortion—Any change to the transmitted signai. May be caused by cross-talk, delay, attenuation, or other factors. Distributed Systems Architecture

Distributed Systems Architecture (DSA)—A Honeywell architecture that conforms to the Open System Interconnection model proposed by the ISO. It supports X.25 for packet switching and X.21 for packet-switched and circuit-switched network protocols.

DTE—Data terminal equipment. A common designation for data processing equipment such as printers, terminals, and computers. Uses a male DB-25 chassis plug.

EBCDIC—Extended Binary-Coded Decimal Interchange Code. An eight-bit code used primarily on IBM business systems.

equalization—Balancing of a circuit so that it passes all frequencies with equal efficiency. Ethernet—A baseband local-area network marketed by Xerox and developed jointly

Ethernet—A baseband local-area network marketed by Xerox and developed jointly by Xerox, Digital Equipment Corporation, and Intel. field—A particular position within a mes-

sage frame. Positions are labeled as the control field, flag field, and so on. Bits in a particular message have a meaning for stations on the network.

consists of the leading and trailing information needed for a complete message, but the information elements of the message itself are left blank. A station with a

IN A SLOTTED ring network, a message called a frame is passed from station to station.

message to transmit fills in the message information as an empty frame goes by All stations read all frames as they go by. The receiving station removes the message from the frame back again, it can receive the frame back again, it can receive the frame back again, it can be station received the frame back again, it and marks the frame as empty. This is and marks the frame as empty. This time of production-line technique assures that timing and spacing of the system are kept constant.

Because of all the frame reading and hendling, slotted-ring systems are not very efficient. The transmission speed of the system may be high, but the throughput of the system is low because of all the

processing involved. A more efficient form of message passing frequently used in ring networks is token possing. A token consists of a very short message that circulates around the ring, indicating: "The channel is clear." When a station has a message to transmit, it grabs the token and changes it to read: "Here comes a message." The station then transmits a message of any length. After the message is transmitted, the station again changes the token to read: "The channel is clear." Token passing is a popular scheme because it allows stations to pess messages of variable length with little network time needed for management overhead. The token-passing technique may also be used on bus networks with good results.

Frequency Division

The time-division techniques we have just examined are similar to the techniques of using stop signs and stoplights to control highway traffic. Another method used to regulate traffic flow is that of

GLOSSARY OF LOCAL NETWORK TERMS/CONTINUED

frame—A group of bits that includes the message and address information. frequency-division multiplexing—A technique for combining many signals on one circuit by separating them in fragulary.

one circuit by separating them in frequency. functional-management layer—Formats

presentations in SNA.
gateway—A device that connects two systems, especially if the systems use different protocols. For example, a gateway is
needed to connect two independent local
networks or to connect local network to a

long-haul network.

handshaking—Exchange of control codes
or specific characters to control the data

flow. HDLC—High-Level Data-Link Control. A comprehensive standard developed by the international Standards Organization (ISO). It is a bit-oriented link-layer proto-

col. Iteration. addending Engineers. A professional organization cadending that has defined several I/O standards. International Standards Organization (ESO)—Best known for the development Open Sy

of a network model called the Open Systam Interconnection (OSi) Reference Model. Internet Protocol (IP)—A standard proto-

col for communicating between devices on different networks. NBS and DOD bave both published an iP stendard. The two are very similar.

LAN-Local area network.

lightwave communications—Usually, communications using fiber-optic cables and light generated by lesers or light-emitting diodes (LEDs). Also may refer to systems using modulated light beams passing through the air between buildings or other adjacent locations.

link layer—The second layer in the iSO architecture. This layer performs the function of taking data from the higher layers, creating packets, end sending them accurately out the physical layer (layer 1).

mark—A signaling condition equal to a binary 1 (see space). media—Plural of medium.

media—Plural of medium.

medium—The conduit used to m

information: coaxial cable, fiber-optic cable, and so on.

midsolit—A type of broadband cable sys-

tem in which the available frequencies are split into two groups, one for transmission and one for reception. Requires a frequen-

cy converter.

multipoint line—A single communications link for two or more devices
shared by one computer and more than
one terminal. Use of this line requires a
poiling mechanism. Also called a multidrop line.

network—A communications system made up of various stations. Use of the term network assumes interaction among the stations.

Network-addressable unit (NAU)—In a SNA, a unit thet can be the source and end of messages.

network layer—The third layer in the ISO architecture. Responsible for maintaining control over the communications links and routing data across one or more communications links. it accepts messages from the source, converts them into markets, and directs the packets to the des-

node—A terminal location in a communications system. A node may also be a switching point where information changes format or mode of transmission. Open System interconnection (OSI)—A model developed by the international Standards Organization (ISO) to describe a network open to equipment from various manufactures.

packet—A string of characters that includes the source address, the destination address, and the message itself. Different systems utilize different-size packets. packet switching—A method of transmitting messages through a communications

ting messages turougn a communications network in which long messages are subdivided into short packets with a maximum length. The packets are then transmitted as in message switching, Usually, packet switching is more efficient and rapid than message switching, packets witching is more efficient and rapid than message switching.

physical layer—ine lowest layer in the iSO architecture. Concerns itself with the voltege levels, speed, and signaling used between equipment.

polling—A method of controlling the transmission sequence of communicating devices by using an inquiry to the device asking if it wishes to transmit.

architecture. Determines how the data are displayed. Concerned with format and visual presentation. protocol-A set of rules governing the transmission of information over a data

PSDN-Packet-switched data network. ring-A network topology in which the stations of the natwork are arranged (electrically) in a ring or circle.

RS-232-C-An electrical standard for the interconnection of equipment established by the Electrical Industries Association. The same as CCITT code V.24, RS-232-C is used for serial ports.

RS-449-A newer standard than RS-232-C. also used for serial communications. Eventually meant to replace RS-232-C, but backward compatibility is specified in RS-449.

SDLC-Synchronous Data-Link Control. A bit-oriented, link-layer communications protocol developed by IBM. Related to HDLC

serial port-An I/O port that transmits data out one bit at a time. Contrasted to a parallel port, which transmits multiple (usually eight) bits simultaneously, RS-232-C is a common serial signaling proto-

session-An interconnection between two stations for the purpose of moving information.

session layer-Layer 5 of the ISO architecture. Determines how the data received are to be routed and processed. Serves as an interface between applications programs and the communications systems. slotted ring-An access method used in ring systems which involves passing an

empty message frame around the system until a station fills it.

SNA-Systems Natwork Architecture. A communications model developed by IBM that integrates computer systems with data communications devices. This model describes functional layers in a manner similar to the OSI model.

space-The signal condition that equals a binary 0 (see mark). star-A network arrangement character-

ized by a central processor that communicates with outlying units arranged like the spokes of a wheel or a star. In the localnetwork contaxt, the central processor is a specialized switch (PABX) that performs circuit switching.

synchronous-A transmission system in which characters are synchronized by the transmission of initial sync characters. No the network protocol level of the system. stop or start bits are used.

sync character-A character (two or more in bisync) sent from a transmitting station for the purpose of synchronizing the clocks in the transmitting and receiving stations.

time-division multiplexing (TDM)-A method of placing a number of signals on one communications circuit by allocating the available time among competing stations. Allocations may be on a microsecond basis

token passing-An allocation scheme used in ring networks in which a very short all-clear message (token) is passed around the network until a station catches it and changes it to "Here comes a message." The token-passing scheme can also be used in bus networks. In this case, each station must know who is next after it and pass the token.

topology-An information industry buzzword meaning the physical design or shape of a system. Common topologies are the ring, star, and tree. transmission control-The layer in SNA

that controls sessions and manages communications. transport layer-Layar 4 in tha ISO architecture. Checks the received data, ac-

knowledges receipt, and sends the data to a specific device (printer, terminal, or disk file). tree-Not a leafy thing that grows in the forest, but rather a network arrangement

in which the stations hang off a common "branch," or data bus, like leaves, twisted pair-An electrical cable used for communications. Often used in PABX systems.

Virtual Telecommunications Access Method (VTAM)-One of the IBM access methods used on an SNA network. WangNet-A local-network system from Wang Labs. WangNet is a broadband local network. Different bands of radio frequencies on the network are designed for different kinds of work. The HDLC packet format is used with the CSMA/CD access

wideband-A channel or transmission medium capabla of passing more frequancies than a standard 3-KHz voice chan-

adopted by the CCITT. It defines the physical interface level, the frame laval, and -F.J.D. ond W.S.

X.25-A

lana markers. Lane markers provida physical separation for cars in ways that are different from the davices that regulate the traffic in time, but both types of separation-time and space-can and are used on the same roadway.

In the same way, both time and spaceor either time or space-can be used to regulate traffic on an information-movement natwork. Information elaments can be physically saparated by using sevaral different radio (or light) frequencies on the same cable. Just like a radio or telavision set, the stations on the network are tuned to a specific frequency to transmit and receive thair messages.

Basehand versus Broadband

Network-sharing systems that use only time-division techniques (polling, reservation, slots, tokens, CSMA, or CSMA/ CD) are normally called baseband systems. The expression refars to the fact that normally one signal occupies the transmission medium at any one time. Baseband networks are like ona-lane roads. The cars traveling down them must take turns using the roadway. Baseband networks can use any form of transmission medium and can be found in any topolo-

The alternative to the baseband network is the multilane highway called the broadband system. A broadband system allows many different stations to have massages on the network at the sama time. The lane markers that divide them are those of frequency. Broadband networks take advantage of the capability of highquality coaxial cable to carry many different frequencies at one time. These kinds of

$B_{\scriptscriptstyle{ROADBAND}}$ cables are inherently unidirectional, like oneway streets or rivers.

packet-switching standard cables are said to have wide bandwidth. The total bandwidth of the cable can be divided among various stations and even among subnetworks in the same way that the commercial radio frequencies are divided between AM broadcast, FM broedcast, television, and so on. Cable systems can carry e radio frequency spectrum ebout 350 magahertz (MHz) wida. This is the equivalent of all of the commercial

REQUENCYagile devices can bring great informationtransferring power, but also higher costs.

AM, FM, and television broadcast channels plus shortweve, citizens' band, ham radio, and most public-service redio frequancies. Clearly, e cable systam can carry a great deal of information!

Broadband cables can allocate the bandwidth eveilebla to three kinds of channels: (1) dedicoted channels that are permanently essigned to pairs of communicating devices such as two computers. (2) switched chonnels, assigned to two devices on the request of a master controller, and (3) shared channels operating within their own network of davicas using time-division techniques. Each group within these alignations is unaware of the others. The common broadband cable appears to each to be a dedicated network medium. Broadband cables can mix many forms of information within a local network. Channels on the cable can be assigned to various data transmission functions, but video signals and voice transmissions can also be carried simultaneously.

The stations attached to a broadbend cable use an RF modem to translata between the ceble medium and their own internal electrical signaling systam. If a station is required to operate only on one chennal, it can have e reesonebly simple fixed-frequency modam that listens end transmits on one limited frequency. If the stetion is to be ebla to jump between networks (move to different chennel frequencies), it can be equipped with a sophisticated multifrequancy modern. These modems can be switched manually or by remote command of a cable controller (which probably is not the sama device as e master network controller). These tuneble modems are oftan referred to as frequency-ogile devices. Obviously, increesed sophistication can bring greet informetion-transferring power, but also higher costs.

Brookend ables use box different kinds of physical configurations. The need for these configurations is caused by the simple fact that broadband cables are inherently unidirectional, like one-way streets or rivers. A station cannot send streets or rivers. A station cannot send "upstream" from it. To overcome this limtitation, there must be two one-way streets going in opposite directions. All information is transmitted on one street, goe down to the end of the cable, and returns controlled to all stations.

The two broadband configurations are frequency translotion and the use of two separate cobles; both arrangements separata the transmit and receive ports of an individual station. The first configuration, called midsplit, splits the aveilable redic frequencies for station transmission and the other band of frequencies for station reception. The translation between transmission and reception is done by a frequency converter. This device is also refarred to as a haadand, frequency translator, or central retransmission facility. but it assantially functions as a frequency convertar. The converter receives the transmissions of the network stations on whet is termed the "return" channel, convarts tham to a different frequency, and rebroadcasts tham on the "forward" channal.

The advantage of this midspilt system to six had only one cable is used. This cold is used. This cold is nest. This cont of installation and reconfiguration. On the negative side, since the midspill system divides the cable into a transmit band and a receive band, tha total usefulness of the cable is cut in half. (Anisa so this cable is cut in half. (Anisa so the cable has a row man is land a row man's land a row man's land a row man's land a row man's land and requescies between the transmit and receive bands.)

The other kind of broadband configuration uses two suparata cables, one for other trensmitting and one for receiving. This is, provides full use of the available bandwidth. One cable is used to trensmit ell signels to a passive connector, and another, suparate cable is used to return the signels that are still on the same frequency. The bis kind of systam bes a higher material is. much capacity as a single-broadband cable arrangement. Its other technical advantages include the alimination of undesirable receiver and transmitter interaction at each station and the ability to connect listan-only subscribers (such es video displays) to the outbound cable.

Message Addressing

So far, we have seen what kinds of medie are used to connect the stations on a local network and how the time and frequencies available on the network are shared among the stations. We need to look briafly at how massages find their wey between stations once they gain entry to the wire or cable.

There are three practical ways to route messages from the sender to the receiver: messoge switching, pocket switching, and time-division circuit switching. A good example of message switching is the talax or telegram service. A complate message is developed, along with all information about the sendar and recipient, and tranmitted into the network. The transmission continues until the antire message is

The most common form of message addressing on local networks is the use of peckets. A pecket of data is actually e string of characters. Each packet includes a destination address, a source address, and the message information in a packet may just be a fraction of the antire message to be sand. The pecket may also include such information of the series of the sand the same and th

A PACKET of data includes a destination address, a source address, and the message information.

mation as an indication of what type of message it contains and a checksum of the message information. A checksum is an arithmetic number that can be derived in several ways. For example, since the digital data is considered to be a string of 0s and 1s, the checksum mey be the sum of all of the 1s in the message. The transmit-



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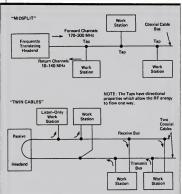
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Broadband cables are designed in one of two configurations: midsplit or twin cables.

ting station assigns a checksum, and the receiving stations recomputes it and compares it to the one assigned by the transmitting station. If the figures are not identical, the receiver can call for e retransmission. This is a form of error detection and correction. Error detection end correction schemes can involve vary sophisticated algorithms that ensure extremely high securacy in the transmitted date.

accuracy in the transmitted data.

In the daign of the system. Some peckets are of fixed length and others of variable length. Some systems may use peckets are of fixed length. Some systems may use peckets access may sound like a large message access may sound like a large message accompared to the long streams of data transmitted by large computer systems. The size of the packet is determined by the designer, based on estimates of total message length, system speed, and other focus of the packet is determined by the large system speed, and other focus of the packet is determined by the large place of the large place place of the large place p

ciency at the expense of more complex tarminel software.

In peckat switching, e block of data has addressing and possibly routing information added to it so that it can traval independently through releys and switchas to its destination. Peckets travelling indepandently through e system may even arrive out of order at the destination, but they can be rearrenged by the natwork processsor or the receiving station into the correct exquance to make a complete message.

A third elternative in digital switching is called time-division circuit switching. These systems use very small blocks of date (swen just one charactar) as thair transmission elamant. They evoid adding eddressing end routing information to this small dote block by the use of signaling channels that are seperate from date chemots. As the character or dete block moves through the system, instructions go out on a separate line as to what to do with it. The coded instructions are simple, and the

data channel is kept cleer of all overheed. The throughput of the dete chennel can be very high. Time-division circuit switching is the newer technique and has not been developed as fully as pecket switching.

In Review

This has been a long end meety chapter, but the information clusters together easily into different mathods of transmission, connection, traffic control, and addressing. Here are some thines to remember:

TRANSMISSION METHODS • Madie: wire, coaxial ceble, fiber-optic

- cable.

 Coaxial cables provide good bandwidth
- and are the most common medium.

 Twisted-pair wire circuits can provide
- Twisted-pair wire circuits can provide good economy under certein condi-
- Fiber-optic systems provide tremendous bandwidth, but installation, maintenance, end expansion ere potantial problem areas unless you have experienced people available.
- CONNECTION

 Topology = geometry.
- The star network is commonly used
- with large central-computer systems.

 The ring network has edventeges where all work is distributed, but it is vulnerable to disruption et any point.
- The bus or tree configuration is widely

OPEN SYSTEM essentially means a system open to equipment from different manufacturers.

used end provides good flexibility and reliability.

- TRAFFIC CONTROL
- Polling, reservation, and contention are schemes used to divide the aveileble time among the stations on a systam.
- Frequency-division multiplexing is e method of dividing the available space (frequency) among stations on e system.

- Broadband cables use frequency sharing to allow many stations to use the same cable at the same time.
- Both time- and frequency-division methods may be used on the same network or on the same medium.

MESSAGE ADDRESSING

· Packets are blocks of information con-

taining addressing information. They move around the system until they reach their destination. The information in the packets is then put together to make a complete massage.

- Packet switching is most common, but systems that send complete messages are also used.
- Time-division circuit switching has potential for very high throughput.

A Standard Network

The number of companies and businesses manufacturing data processing equipment with a data communications capability is growing quickly. Some of these devices are only pieces of a total network. They need some common conceptual basis to be integrated into the network plan or architecture. Working standards for signaling, coding and network transmission have been in daily use for many years. But, because of differences in design and actual application, computer and terminal systems produced by different manufacturers still probably will not operate together on a network without extensive custom designing

An Electrical Standard: RS-232-C

There's more to this standard for communications than just using a 25-pin socket and cable.

Computers communicate internally and externally via digital signals. Inside every system, direct-current voltages are switched from moderate to very low many times a second. These changes in voltage represent digital bits of information. However, the voltages used differ from one system to another. Even in the microcomputar family, different microprocessors use different voltage levels. If all systems are to communicate on a common network. some standard for external voltage levels must be set. We need a solid definition of the electrical standards to be used. This has been supplied by the Electronic Industries Association (EIA) standard code RS-232-C. Outside the United States this code is known as the International Consultive Committee Telephone and Telegraph (CCITT) code V.24. (It may also be considered a part of the CCITT standard X 21 which is recommended by the larger X.25 standard previously described. This code provides a common description of what

the signal coming out of and going into the serial port of a computer or terminal will look like electrically. Specifically, RS-232-C provides for a signal swinging from a nominal +12 volts to a nominal -12 volts at certain specified current levels and resistive loads. The standard also defines the cables and connectors used to link data communications devices. Using this standard code simplifies the job of setting information in and out of a computer, terminal, or peripheral device. A new standard, called RS-449, which will eventually be a replacement or an alternative to RS-232-C, has been adopted, but compatibility with RS-232-C is specified in RS-449. (RS-449 has also been adopted as U.S. Federal Standard 1031.) The X.21 standard calls for a 15-pin connector: RS-232-C uses a 25-pin connector, and RS-449 calls for a 37-pin connector! As you can see, the establishment of a standard, even one as fundamental as an electrical standard, is not a simple task. However,

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RS-232-C will continue to be a useful signaling standard for many years to come, so let's see how it can be described.

The terms commonly used with electrical coding standards may be confusing. They are often carried over from other systems, but once you get them straight, they are easy to understand. Because of the peculiarities of solid-state logic devices, a logic stote called "0" may not indicate 0 volts. Indeed, just the opposite is true. A logic state of 0 is defined as the positive voltage (+3 to +24 volts) signal in RS-232-C. This is also known as a spoce signol. Spoce and mork are two designations held over from the days of mechanical printers, which are operated by electromagnets and driven by direct-current circuits. If you read any literature stating that a space should be transmitted, you know you are looking for a positive voltage or a 0 logic stata.

The logic state of 1 is just the opposite. A logical 1 is a negative direct-current voltage: it is also known as a mark. You may with to remember the santence, "The teachar gave the student a low mark, but a logical one." The change in the direct-current voltage level serves as the signal or bit of information in the RS-232-C system. These bits are sensed, countad, and stored by data communications devices. The direct-current to this pieter.

connection system can travel only about 50 feet before they lose their important electrical characteristics, so RS-232-C signaling is not used directly for long-distance communications. (The actual maximum effective DC nath danends on many factors such as speed, cable type, and so on, but 50 feet is a standard for reliable high-speed service.) RS-232-C signaling is used to connect equipment divided into two groups: data terminal equipment (DTE) and data communications equipment (DCE). Doto terminol equipment includes terminals of all kinds, computers, plotters, printers, and so on. Doto communications equipment includes mainly modems and other special interconnection devices. RS-232-C is the most commonly used standard for local connection of computers, terminals, and

RS-222-C Is, however, just an electrical standard. It defines the voltage swings and other electrical parameters. It does not define what the voltage swings mean in terms of intelligent information. It is a sif we said we will all use red and blue flags for signaling, but we had not defined what has position of the flags will mean. Another standard, a coding standard, such as ASCII. is needed.

modems.

-F.J.D. and W.S. (from Chapter 5)

This chapter will introduce two models of a communications natwork. The first is an international model established for many kinds of systems. The second is a model established by IBM

The OSI Model

The problams of compatibility between the systems of different manufacturers were recognized early, but little was done to find a solution until 1977. In that year, the International Standards Organization (ISO) chartered a committee (Snacial Subcommittae 16 of Technical Committee 97) to study the problem of compatibility in data network equipment. Their work continued for a number of years and led to the publication of several versions of the Open System Interconnection (OSI) Reference Model. The term open system essentially means a system open to equipmant from different manufacturers. This OSI reference model is useful for envone involved in purchasing or managing a local network because it provides a theoretical framework on which you can hang practical opportunities and problems.

Tha dasign of such an open system has proven to be a vary difficult task because of (1) all the manufacturers and standards organizations involved and (2) tha siza of the problem. It involves much more than just alectrical signaling.

A local network must be thought of as a single entity. The system has many parts, but they all interrelate. The OSI model provides names for the parts of a

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The construction of a packet using IBM's Synchronous Data-Link Control (SDLC) bitoriented formot.

communications network. It doesn't matter in a general sense if the natwork is local or international. The size of the network may limit or increase the importence of certein of its parts, but they will all be there in one form or enother. The OSI model uses specific definitions to describe the various portions of the network. It speaks of "layers" of functions arranged in e hierarchy. This gives the impression that they are all neetly stecked, with firm boundaries between them. This is not the way they operate in the reel world. In a real system, one printed-circuit board might perform elmost ell of the functions called for in severel layers of the model. Still, the modal provides a good way to structure your understanding of a network. It also ecquaints you with more of the concepts and jargon used by professionels in the industry. Throughout this description we will use the term lover because the industry uses it. Please think of each lever es e function that must be performed.

The Application Laver

The OSI model has seven functional layers. The top function, the one you should elways keep in mind, is the enduser epplication. This is where the

model provides names for the parts of a communications netzvork.

mechines telk to the people. If this applicetion isn't properly handled, the entire system is usaless. The goal of any communications system is to serve the

user whan and how the user wants to be served. It is interesting to note how often this is turned on its heed end we find the user serving the system. The ISO committee calls this layer 7 in its model.

The opplication lover is concerned with the information in the message end how wall it sarvas the usar. There are no firm protocols or standards for this function except those of common sense, utility, end logic. There ere meny common practices, but they are tied to the functionel program being used end cannot be discussed here. The application layer is the most critical layer, but your common sense dafines it.

The Presentation Laver

The naxt down in the model (laver 6) is the presentation function. The presentation lover prapares the information for the application. An example of this function is the conversion of e file received from e brand-X word processor into the proper format for display on a brand-Y system. Each word processor might use different codes to set the ends of paragraphs or the length of a page. The presentation function would have to know the differences end provide for them. This could be done in hardware, but it is mora likely to be done in software

The Session Layer

The session lover (laver 5) is a coordinating function. It esteblishes the communications link between units (like batween the two word processors above) and gradually feeds or buffers the information to the devices or program performing the presentation function. The session lever also provides the sometimes critical identification and authentication functions. It recognizes users and acknowledges both their arrival and deperture. In some systems, the session layer can be a driving factor in system design. In others, it is a very small consideration. When it is

most important, this job might be done by a separete micro- or minicomputer. In its minimum form, this job could be done by a couple of small integrated circuits.

The Transport Layer

The transport layer (leyer 4) functions to provide e common face to the communications natwork. It translates whetever unique requirements the other higher layers might have into something

find the user serving the sustem.

the network can understend. It also makes the most affective use of whataver various communications media it is connected to and selects the bast or most logical routa for transmission. It detects and corrects arrors in transmission and provides for the expedited delivery of priority messegas. It checks the data, puts it into the proper order if it came in wrong, and usually sends an acknowledgment back to the originating transport layer. It ettempts to reastablish contact in the event of a network failure

Severel industry and govarnmental standards axist for a transport function in data communications devices. The IIS Dapartment of Defense has edopted e transmission-control protocol (TCP) thet hes meny functions end options. The Bell System has also released a protocol called BX.25 which describes, among other things, the transport, session, and presentation functions

The transport function is en important part of any communications davice. It would normelly involve both hardware and software and be specially configured to match both the equipment it is on end the network it sarvas.

The Network Laver

The network lover (laver 3) sets up e logical transmission path through e switched natwork. In local networks this path may only be theoretical, since the individual units are elmost alweys electrically connected into the circuit and the paths are defined by the network topolo-



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gy. But in large systems, several transmission paths and even elternative media (dialed telephone service versus leased electrical level. service, for example) may exist. The transmission path may be temporary in neture-lasting only long enough to transfer a packet of information-or it may pro-

vide continuous connection for two users of the network. In a local network, the network control function can exist in one place (star network) or be distributed (bus or ring), It is essentially made up of softwere that recognizes various conditions on the network and reacts to them.

The Data-Link Laver

The dota-link faver (laver 2) does the eccounting and traffic-control chores needed to transfer information on an electrical link. It forms the information to be moved into strings of characters such as hisync those used in IBM's communications protocol or Into blocks of bits such as those used by the HDLC protocol. The data-link lever functions like the foreman in a railroad vard who is making up a train. It puts every piece of information into the right place and checks it out before putting it on the tracks. Similarly, incoming information is broken down and properly routed with the receiving device.

The data link was originally thought of as being a function of the software in a device. It is increasingly being done by special-purpose integrated circuits requiring little external programming.

The Physical Layer

This functional level can be very troublesome and occupy the time of an expensive technicien if it is not properly planned. The physical foyer (leyer 1) describes the electrical and physical connection between communicating units. It is often the most visible and sometimes a very troublesome part of the system, but it shouldn't be.

In 1960 the Electronic Industries Association (EIA) esteblished en electrical standard for interconnection called RS-232. The stendard has been revised three times, end the most current standard is called RS-232-C. RS-232-C is an electrical signaling standard. It conforms closely to the international X.27, X.26, V.11, and V.10 standards. This means that equipment (such as a modem and a terminal)

that conforms to these standards should be able to work together on the most basic

There are other electrical standards, such as IEEE-488, that are also commonly

HE GOAL OF any communications sustem is to serve the user when and how the user wants to be served.

used for the interconnection of certain kinds of communicating equipment. Equipment designed under this stendard will not operate with RS-232-C equip-

RS-232-C will gradually be replaced by a newer standerd, RS-449. However, RS-449 equipment should be electrically compatible with RS-232-C equipment (afthough the cables are not the same).

The three lowest layers of the OSI standard-the network, date-link, and physical interface-are described by a number of existing standerds. The most commonly referenced standard is Recommendation X.25 of the Consultative Committee for International Telephone and Telegraph (CCITT). Recommendation X.25 was edopted in 1976. It has been modified

many times and has several variations. Not all manufacturers support all portions of X.25, but it is becoming increasingly important as e standard. It is the best thing we have to describe the connection between equipment on a public packetswitching network. The recommendetions of X.25 carry over into local networks with little or no change.

IBM and SNA

IBM began promoting its Systems Network Architecture (SNA) in 1975. SNA is e network erchitecture or plan like the OSI architecture. Like the OSI architecture, It describes the various jobs to be done by stations communicating in a network in terms of e series of functions or levels. The OSI architecture and SNA have meny sim-

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ilerities, but the names differ. SNA's leveis are described differently from those in the OSI exchitecture. The description of SNA includes meny specific terms, such as node, network-oddressoble unit, physicul unit, and logicul unit.

An SNA node is a general term for a central processing unit (computing unit computing controllers, and the local communications controller, and the local communications elements. SNA communications elements is supplied to any size network covering any goographical error, so it also defines subres nodes in the communications between nodes. SNA effects subres nodes. SNA effects subres nodes can communicate between themselves while peripherel nodes can communicate the subres nodes can communic

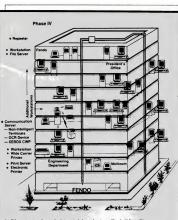
Network-addressable units are the hardware and software within terminals and computers that interface with the net-computers that interface with the net-conceptually, but in a terminal or computer the network-addressable unit may consist of several pieces of hardware and softween that can serve several different function. The serve is the logical unit and the physical unit. The terms simply indicate the difference between the software the user sees (logical unit) and the equipment that network sees (logical unit) and the equipment that network sees (the physical unit).

The top level of the SNA structure is the end-user services layer. The end user may be e person, a device, or even an operating program. In their leter literature, IBM calls this the services-monoger loy-

SNA'S LEVELS are described differently from those in the OSI architecture.

The second layer of SNA is called presentotion services. This layer provides the interface between the end user and the network. It gives the using person or device certain rules, capabilities, and methods of using the network. The third layer, the doto-flow-control

The third layer, the doto-flow-control services, determines if units on the network will operate in the helf-duplex or



An Ethernet network may be integrated throughout on office building. (Diagram courtesy of Xerox Carporation. All rights reserved.)

full-duplex mode. It will "chain" togethar messages or parts of messages that can be logically grouped because they are going to the same receiving station. It also groups data according to specific transactions (the airlina reservation for a certain customer, for axample), if that is

appropriate.

The next layer, the transmission-control loyer, provides the protocol used between two communicating devices to control and acknowledge the transfers of information. The transmission-control information are transmission-control attackes them to the message. The headers are useful in performing the session-lavel pacing function. This function simply means that communicating units pace their transmission speeds based on acknowledgments and message numbers convolved great and message numbers.

contained in the message headers.

The poth-control loyer provides the logic to route messages through a network. The path-control logic determines how a message travels when more than one route exists in a multiconnection network.

The doto-link-control loyer performs the important function of error detection and correction. It detects errors occurring during transmission and requests retransmission. Data-link control may use the SDLC protocol or a protocol called chonnel doto-link control, common in IBM 370-series mainframe communer systems.

These SNA functions combine to create, routa, control, transmit, and acknowladge messages flowing through a network. This description of SNA has been condensed to the point where an IBM designer would barely recognize it, but it serves

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\$15,000. (See a portion of the study results below.) Yet PIE: Writer can be part of your personal computer system for just \$149.95! So now your business or

So now your business or home microcomputer can have capabilities equivalent to the industry's top machines. Naiman says:

wines. Natman says:
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And <u>Interface Age</u> said in an in-depth review of PIE: Writer's current version:

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	Operating system(s) and/or machine(s)	Price	Overall Score
CPT 8100	dedicated word processor*	\$15,000	94%
Dictaphone Dual Disp.	dedicated word processor*	\$13,500	851/4
PIE:Writer:	Apple II, IEM PC	\$149.95 \$199.95	84%
A.B. Dick Magna SL	dedicated word processor*	\$14,500	83
Write	CP/M†	\$400	821/4

^{*}Includes word processing hardware & multistation support

Why the experts love PIE: Writer.

Why all the fuss?
Here are some of the features reviewers chose as the basis for PIE: Writer's excellent performance, and the reasons why you

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tation. PIE:Writer is copyable to

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PIE: Writer can edit either text or programming code.
PIE: Writer is compatible with a wide range of hardware

And reviewers note that PIE: Writer has refined the most sought-after editing features:

- features: wrap/columnar option
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 ✓ global word search &
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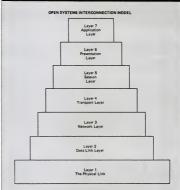
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The Open System Interconnection (OSI) model is designed to define the functional jobs that must be done when transferring Information. Some loyers become more important than others in certain kinds of networks. Several functional loyers might be combined in one physical piece of equipment or one piece of communications software.

to give you a feeling for the kind of structure involved in SNA and the functions that are addressed.

SNA is not commonly used as a local

SNA IS NOT commonly used as a local network standard, but local networks may

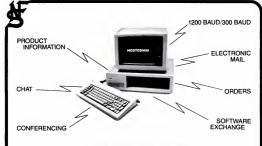
have to connect to SNA sustems.

network standard, but local networks may have to connect to SNA systems through protocol translators, which are computers themselves. A System Perspective

The purpose of this chapter has been to give you at hoccetical perspective on what goes on inside a data communications system. Moving information is complete work, and there are many jobs to be done. It is important never to be so overcome by the technical details that you forget the goal of an information-movement and processing systems: service to the user. PEC

Frank J. Derfler, Jr. is a telecommunications monoger with the Department of Defense. He is the outhor of Microcomputer Data Communication Systems and a contributing editor for PC Magazine.

William Stallings is a senior doto communications consultant at Honeywell, Inc. He has monoged the design and development of several doto communication systems. He received his Ph.D. in computer science from M.f.T.



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> COMPAQ PORTABLE COMPUTER



The Pulitzer Prize winning author of the current hit play 'night, Mother explains why computers enhance creativity.

Marsha Norman: A Broadway Playwright Collaborates With The PC

Marsha Normen has a lot in common with the IBM PC. Smert, versatile, and attractive, they both have a way with words. They've both received virtually universal acclaim in their respective fields. And they both worked on Norman's fifth play, night, Mother, which won her the 1983 Pulltzer Prize for Drama.

'night, Mother, might be called a "reeltime" drama; clocks onstage drive home the point. The premise of the two-character work is simple: A woman announces she is going to kill herself, and her mother tries to talk her out of it. But the emotions and issues that develop are highly complex, and the pley has drawn accoledes from even the crustiest Broadway critics. 'night, Mother, esrned Norman the 1983 Susan Smith Blackburn Prize for "Most Outstanding Play Written by a Woman for the English-Speaking Theater." It also received four Tony nominations-two for Best Actress, one for Best Director, and one for Best Play.

In May The New York Times Mose

zine featured Norman as the exemplar of a new breed of women writing for the thester. She has written for movies and television and has received grants from the Notional Endowmen for the Arts and the Rockseller Foundation. Her 1979 Off-Bradwey success. Getting Out, has been translated into 12 languages and produced throughout the world. Her current project is a musical, Winter Shokers, In collaboration with commore Norman I. Berman.

For most of the past year, Mersha Norman has been doing all her writing with WordStor on an IBM PC. In an exclusive interview in her New York apartment, the 33-year-old pleywright discussed the Changes the PC has mode in her work, her strong opinions about her machine, and her thoughts about the electronic future. PCC Did you write 'night, Mother on the PC?

NORMAN: No. I did the revisions for 'night, Mother on the PC. Whot I did—in order to learn how to use it—was put 'night, Mother in, put the Shaker musical in, ond The Holdup, which is on old ploy of mine. But octually I've written the Sho-ker piece on the PC, becouse I've virtually thrown out the old version. As a motter of foct, if the Shaker musical is a success, it will be the PC that's responsible.

PC: How long have you had your PC?

PC: How long have you had your PC?

NORMAN: Since November of lost year. I
bought o 64k PC, the monochrome disploy, the NEC 3550 printer, WordStar and
MailMerge—thot's oll. Just this morning I
odded o 256k card and ProKey.

PC: What did you use for your writing before you bought a PC? NORMAN: For obout 4 years I had on IBM

Electronic 60, which I had to have repaired obout every 6 weeks. Before that I had a Selectric. And I obsolutely destroyed the Selectric. I mean, I used it until it died—literally died. Yau could use it os a paperweight. So I om on IBM customer.

PC: When did you begin thinking about

using a computer?
NORMAN: Probably about 5 or 6 years

PC MAGAZINE 277 AUGUST 1983

it was simply a stopago measure and that the sooner I could afford a computer and the sooner I could afford a computer and the sooner I could actually get one, the better it would be form e. I knew from the beginning that's what I wanted. That's just he leging that it wanted that's what I wanted that's he leging that it wanted to be sooned afford that it wanted in the future. I want as little labor as possible between me and my work

WANT AS little labor as possible between me and my work.

PC: Did you know any writers who were using computers at the time?

using computers at the time?

NORMAN: I would read the pieces that
came out occasionally—so-and-so is using a word pracessor, that kind of thing—
but I really didn't know anybody else.

The Power of Possibility PC: What made you finally decide to go

out and get one? NORDMAN: Simply hoving the money. And hoving some confidence that the technology was toble, that I wouldn't contain the containing the computer. It was containing me time and energy, and I really do think it was lowering the quality of my work. I we always been really driven to work, so I show so the containing the quality of my work. I was a contained to the containing the quality of my work. I would not the containing the quality of my work. I would not the containing the quality of my work. I would not the containing the

stantly typing. Really, until I got the computer I was typing for a living. PC: Why did you decide to buy a personal computer instead of a stand-alone word processor?

NORMAN: Well, I did an awful lot of reading, and I attended seminars, and I realized twa things: First of all. Ihal the computer was less expensive than the stand-olone word processors, and second, that it was more flexible—that there were all kinds of things it could do. I mean, one of the things I believe in in my life—and

you see it in my work—is that pawer of possibility. I knew that while I was not buying the machine in order to become a programmer, who knew what would hopnen once I had it?

For example, I guess it was about a month before I actually did any programming. But I had bought the IBM Typing Tutor so that Dann, my husbond, could learn to type on the computer so that I could give him my old typewriter and then he could do his own letters if he wanted to. Then he complained that the Typing Tutor didn't have real sentences to proctice on. So I thought, well, all right. I spent all of Saturday and Sunday learning just enough BASIC to devise a typing test for Dann-one that would reward him with a lovely compliment and give him a new sentence if he typed it correctly, and ane that would insult him terribly and give him the old one to retype if he made a mistake. And then I fooled around

some with the Play command. As a matter of fact, one of the songs from the new Shaker musical is on the computer. Take Over My Life—Please! PC: Did you have any prior experience

using computers—terminals, anything? NORMAN: None. But that's just a part of my personality. I'm just not offaid. PC: You had no technophobia? You had no feeling of, my God, this thing is going to

take over my life?

NORMAN: No, I could hardly wait for it to
take over my life. That is exactly what I
wanted it to do.

wanted it to do.
PC: How'd you go about shopping for a

NOBMAN: I reed the Peter AdWilliams Word Processing Book. I began to road various magazines, and I talked to people Word Processing. It was octubly a seminar at the Writers Guild that complete the decision-making process for other than terms of both WordStar and the IBM. I was a for of inclined to go with IBM because I do been their customer, and my natural inclination is to go with the way to the way way of making sure that I wasn't just making in a design decision.

But I alsa loved the keyboard. I tried the Victor and I tried the Apples, and I really just loved the feel of the PC keyboard—in spite of the misplaced keys. PC: A lot of writers totally hate that keyboard. After 2 minutes, they've hit so many backslashes that they walk out of

NORMAN: Well. I did n little troining thing, All I had in the house that I could use as a factile key rots a small Band-Aid. So I turned it cornual: I put the sticky parts of the Band-Aid down on the Return key so that when I hit it, what I felt was the fuzzy port that would normally go nn the cut. I mean, here you have a \$5.000 machine that you're learning to use with the help of a Band-Aid.

PC: You didn't do anything about the left shift?

NORMAN: No. I just never used it.
PC: Did you on your typewriters?
NORMAN: Yes. But I just decided I didn't want to deal with it.

Dealing with Dealers

PC: How did you pick a dealer? NORMAN: I nicked Datel, which I've come to regret, because somebody else at the seminar told me that they'd had good experiences with one of the people there. who is quite knowledgeable and wonderful to deal with. What I had heard about Datel was that they would send people to your house and that they had their own service operation so that I didn't have to deal with IBM right away. The kid who come to install it was quite wanderful. They're wonderful individual people, but there's nobody in charge at Datel as far as I can tell, and they've been totally and completely inept.

The tractor feed that I ordered for the NEC was not available and is still not available. I mean, I've had the machine for 7 months now, and t have no tractor

My NATURAL inclination is to go with design. I loved the way the PC looks.

feed. Ordered it 7 months ago, paid for it 7 manths ago, and I can't get either my tractor feed or my money from them. Since I've been dealing with Datel, two consecutive people who've been assigned to me have left, and nobody seems to know what's going on.

There's also a real discriminatory thine about wamen going in to buy camputers. You walk in, and they think, "Oh, are van here to pick up paper far vaur bass?" It is really tacky. So you have to stand there and prove that you know what vau're doing. You have to sling some of the language around, and then they say,

"Oh, you've been here before!" which is really insulting. PC: In fairness, that also happens to guys who don't happen to be wearing business suits. The salesmen figure you're not likely to place an order for two dozen machines And it's true at IRM too As an IBM customer, did you go to a Product

Center? NORMAN: Yes, I made on oppointment and said that I was interested in word processing. The woman took me aver to the desk, offered me coffee, and we had a nice little chot. Then she took me up to the Displaywriter. And I said I really don't wont o Disploywriter, I want a PC. And suddenly she turned into a different persan. She velled across the room: "Horry! Can you

take this one?" Their price was higher than Datel for non-IBM equipment, and I just found them very cold. And I om really disoppointed, because in all my other dealings with IBM through the years. I found them ta be thoughtful and caring and concerned. And here I om, one of their loval customers-of course, they had no way of really knowing that-and I went in and I said this is exactly what I want, what ore the prices and when can you have it for me? The guy did not even coll me back to see if maybe I had decided.

But at the time that I was ready to buy-I meon, the doy I was ready to buy-IBM didn't have any machines and Datel did. I think in the end it was one of those occidents.

An Hour of True Panic

PC: Haw long did it take you to get the machine up and running?

NORMAN: They came and installed It. There was an haur of true panic when I thought, "Oh Lord, if it's off now ond I turn the switch this woy, will it be an? And whot hoppens if I hoven't dane something correctly before turning it on?" I mean, I had all af that terror. Sa I just stopped everything, and I spent o couple of hours reading and proceeded slowly, and then by the end of the day I was really comfort-

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able that I couldn't break it. By the end of a week, I was dains all the very simple things that I needed to be able to do. And I guess it took me about 3 weeks to be totaly fluent in WordStar—to feel comfortable and know that I never wanted to work any other way.

PC: Why did you choose WordStar? NORMAN: I really needed a screen-oriented program. I wanted one that was as flexible and elegant as passible. I just like the arrangement of WordStar. With the exception of formatting for screenplays. I really felt it was just the program that would do everything that I needed.

would do every uning mult r riseeses.

The found it to be real exciting to work
with. I mean. I really love knowing that it
with the man but the property of the real
will do it will not be the property of the real
presence of mind. One command I use all
the time is CRT-XT, delete the line under
this. And it works. Whether it's just the
fact that the computer goes back and
reads CRT-X, CRT-X, I don't know, but in
w mind it's not two secondres extines.

Manual Labor

PC: Do you sgree with the complaints about how hard WordSter is to learn? NORMAN: Absolutely. They ought to have some of use-writers—de the monu-ois I found I had to use the Naiman Introduction to WordSter book. Actually, I bought it before I bought WordSter that was one of the way I determined that I wanted WordSter. Find I worked through and the word of the word

PC: Did you use WordStar's training guide?

NOBMAN: Yeah, porticularly for the block commands, and some of the dot commands, and some of the dot commands, which were so hard for me to commands which were so hard for me to copy what I already have set up at the top of one file to same other file so I don't have to remember whether the .op goes before or after the header and the .pnl. I mean, who ever wants page numbers at the bottom of the pages.

PC: As a writer, haw do you feel about the computer documentation you've seen? NORMAN: I find it all unbearably canfused. First of all, it seems to me that the people who write the manuals have no idea wha is gaing to be reading the manuals. I mean, they really ignare some of the classic issues that you always have to deal with as a writer. And I was really irritated at the WardStar manual and at the PC manuals, although I understand they

THE PEOPLE
who write the manuals
really ignore some of the
classic issues that you
always have to deal
with as a writer.

are the best. But I found them just impossible. When there are four separate directions about how to install WordStar—I mean, four separate sets of directions, all of them different—that's just crozy.

For example, my WordSter is naw installed for a parollel printer instead of the NEC, simply because I read an installation instruction and it didn't tell me to go da the installation for the NEC. It works just fine, though.

PC: Have you had any hardware or software problems?

NORMAN: I've had no problems whatsoever, although in installing on new memory card, Steve Siebert of Bibliophiles just pointed out that the display card on my machine is missing its bock bracket and frant card guide. It's just sitting loase in the slot—samething else Datel did wrang.

PC. The writer's worst lear seems to be losing text. Has that were happened to you NORMAN: I've newer lost caything. But I're med confeil—jout so a human for I're med confeil—jout so a human for I're that it is the I've not those things. I memmehre the first time I went out the margins and suddenly got this whole orny of text sliding off the left end orny of text sliding off the left end to universe. It really upset me. But thut's so serious on error of i ever made. And of course, the text came right book.

The Most Wonderful Gift PC: What does working on the PC offer you that working on a typewriter doesn't? anything that I've written is permanent until I decide to make it permanent. And what I think has happened is that my mind has assimilated the Save commands so that I now think of everything as just a RAM entry that only goes to disk manths and months and months later. And that's wonderful for me.

wonderju jor me.

So often in the past I've been concerned about how to da diterotions and not change the tool number of pages. I've done rewrites where my primary concern was how to have to rety ea tillt as possible. And that habit was so bod; it was such an ingrained part of the way that I worked, that I'm horrified to know it

The Block move is probobly the most wonderful gift to writers. It allows you to see quickly what a chonge will mean, keep it, go bock to the way you had it, or make the other changes that the first change makes mecessary. You can't do this with the typewriter, because by the may you wranted to see. You can't do this with the typewriter, because by the way you wranted to see. You can't account you way you wranted to see. You can't account you way you wranted to see. You can't account you can make told structural olivertions. Ilke taking down the walls for a minute or replacing were you ther bond in the floor.

Somebody, Archimedes probably, said to could move the earth if he had a lever long enough and something to stand on Doling rewrites, your broin in the lever long enough, and naw, the computer is what were change that never even occurred to me, because some time manager in my broin knew how long it would toke to test the ideas. Now, I can do whatever I can think of to do. It what powerful a tool. The campeter allows me to good as I can campeter allows me to good as I can campeter allows me to do some cost me and the campeter allows me to do some cost me and the campeter allows me to do some cost me and the campeter allows me to do some cost me control and the campeter allows me to do some cost me cantillage to rewards the cost me cantillage to rewards the campeter cost me cantillage to rewards the case of the campeter cost me cantillage to rewards the case of the campeter cost me cantillage to rewards the case of the campeter can be considered to the case of the case of the campeter can be called the case of the campeter can be called the case of the case

History's Loss

PC: Do you save copies of old versions as you revise?

NORMAN: When I've completed a droft that I think is a sort of working droft, I will generolly print ane aut. I'm tending to save those, though I think that what will definitely suffer as a result of working on the PC is the archival responsibility.

For example, with 'night, Mather, I had the mast wanderful collection of letters and notes and old pages—I've even given

Invest in comfort, the dividends feel good. The PC Pedestal^M by Curtis virtually eliminates backache.

some of those pages away at presentawhere new speeches will uddenly be written in while an extra ext

ry's loss, it's not mine. But I do keep some old versions. This happened to me with The Shakers, because I did a stortling revision of Winter Shakers. I mean, I did basicolly o completely new script. And I'd hove a file called 1SHAK5.TXT-vou know, first oct of Winter Shakers, scene 5. I would go through and I would make a file called 1SHAK5.NEW, and then one called 1SHAK5.NE2, so that of ony given moment I would hove three or four versions of the same scene, which I would keep coded. It was a way to keep two or three drafts an a disk, and then when I finally decided which one I wanted. I just went

ones.

I am to the paint now where I just happily erose. I have this whole series of KB, then QC, then KK, then KY, and suddenly the whole thing is gone, ond it's wonderful, but it's this little outomatic eight-choracter sequence. It'll probably be a ProKey sequence naw.

through and deleted all of the dumb

A Forgiving Personality

PC: Do you think that the computer helps make you a better writer?

NORMAN: Oh, obsolutely. What I think it does is remove the limitations that were

P.C: DO YOU think that the computer helps make you a better writer? NORMAN: Oh, absolutely.

creoted by the typewriter. It reolly soys to me, it's not finished until you can't think of anything better. There's no way that you're going to run out of time. We have simply given you, with this mochine, all the time you cauld possibly need—every' conortunity to think abaut it again.

One of the things I love about the com-



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puter is that it's port of its personality to be forgiving, and it doesn't lough at you, and it doesn't quit, and it doesn't soy "Oh, came an, hoven't we done that enough?" We had a foscinating session just before went fator behavioral with 'night'. Mother when Tom Moare, the director, and I sat down to the computer—the hold next down to the computer—the old next even been in frant of o screen helpre—and went through the ploy line by line os o way of really talking about it. The lines would just roll by, and he would say,

wuuld just roll by, and he wauld soy, "Well, now, I'm thinking obout thot beat," ond I would soy, "See this cut I mode in this speech?" ond we worked through the script sentence by sentence. It ollowed us to ottend to the script in o kind of detoil that we would never have done before.

It also ollowed us to make changes instontly. Normolly, you know, you'll have a conversation with the director, and you'll be tired ofter on hour and a half. und you so home ond do the rewrites. And then you have to hove another conversation where the director comments on the rewrites, and it goes on and on-endlessly. This way, Tom und I sat there, I did the revisions, I showed him the ones I wonted tu moke. I quickly responded to what he hud to soy, ond we octually produced the rehearsol copy of the script right there together, and printed out a copy of it, and he took it home. With 'night, Mother, all the revisious since the Boston opening were mode on the muchine.

File Management as Character PC: How is the PC helping with your new musical?

NORMAN: The computer is fobulous in

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doing something like o musical. For the Shuker piece. I have the title page. I have the cost and the set, but the title page is one separate file, so that every time I do revision I just go in and change the date and that's oll done. Then I have the scenes as separate files, and I have the lyrics os separote files. So that with MailMerge I con print out o set of lyrics, I con print the whale thing, ar I con wark on the scenes individually and not after the totol length or canfiguration of the piece. To keep it organized that way would be so difficult to do if you were twine.

to do if you were typing.

But I think file monogement is just one
of those things that ultimately sorys who
you are as o humon being. I hove o friend
who hos WordStar with 64K and wrote a
play with two files. Well, now thot's just
crazy. Can you imogine how long he is silting there wotching WAIT? I mean, just
forever. Moybe if he'd hod more memory
or argonized his files better, he'd still be
writtine sloves.

I have olso monoged not to have the page numbers of the bottom so thought red mobody reading; it will have ony ideo how long it actually is, which think is just one of those great odvontoges. You don't wont somebody to say. "Oh. my, it's the Shoker musical," and then turn to the back and see that it's o hundred and two pages long and panic.

one joined a decision this fined time I mode a decision this fined through that instead of using portfculor nomes. I wonted to indicate that this was the heart Decon, or the Trading between the tendence of the thing to the thing to be the tendence of the healt with ten!"

Writers in Terror PC: How do other writers you know view

computers?
NORMAN: With terror. Stork terror. I've

NURMAN: With terror. Stork terror. I or run into olmost universol terror. I orn just about the anly writer that I know who's using ane. And I'm the only ploywright I know who hos one.

Wendy Wasserstein just got a Guggenhim, which is \$20,000, and I told her the best single woy to spend that money is to buy a word processor. I spent 45 minutes of o party trying to talk to her obout it, and she just didn't believe me.

I cannot imagine being without one. I dan't understand their terror. Moybe they think the writing's coming out of the relationship to the typewriter, or thot somehow the closer to the quill pen you get, the better you are, but I just dan't believe thot. Our choracters hove to chonge so we con have samething to write about. It only

seems foir that we change in order to present our characters more clearly. PC: What is it about writers? Why do so

many of us have this antipathy toward technology? NORMAN: Oh, because we are coptives of the voadoo. I mean, we think if we have

SPEED IS really the least of the advantages.

this little frog stitting by our desk, we will have goad ideas. Or if we don't tolk about it, we will somehow be oble to keep all of our best secrets. We ore just superstitious so a group. We ore ofruit dut something might interfere with this force, this creative mystery. And whot I om finding is that the computer has anyly made the mystery more powerful. more exciting, put me in touch with it in a woy that's more direct.

PC: Do people say you'll be a worse writer in the future because you use a comput-

NORMAN: Yes. People soy it will destroy me. You will just be writing all this fast tolk, they soy. But the interesting thing ance you begin to work is you see that the speed is really the least of the odvantoges. Whot's important is whot it does in obsolutely freeing you to think of whot oil the possibilities might be.

Also—hough I never neally did how much trouble with this—the computer totally eliminates writer's block. It used to be that you would sit there, and you would pore over the sentence, and you would pore over the sentence, and you would nove to retype it. Now, you con simply sit there ond type "The work to be man face in the property of the property of the beams face it in the property of the property of the to say. There is no reason to sit and store onwhore.

I olso find that there are some other wanderful effects. The letters I write are funnier, becouse, once ogain, it doesn't cost me onything to moke o joke. If the joke doesn't work, I'll go back and toke it out. There's o kind of flipness, quickness. In that way it's olmost more like the tele-

Arrange your PC any way you like.

phone in that it's a kind of instant writing. You don't have to consider that this thing is going out for all af posterity, you don't sit there and think "I only want to have to type this once sa I'd better be careful."

Burnout and Possessiveness PC: Do you see any negative aspects to

using the computer?

NORMAN: There is one danger I have learned about. And it's only dangerous for me, given my tendency to averwork, My old schedule was that I would work 6 or 7 hours a day, 5 days a week, or 6 days a week sometimes. I find if I do that an the computer, I am absolutely exhausted, I have nothing left. I don't have any conversation left. I don't have any ideas left, I have nothing. The camputer allows me ta accamplish in 3 hours what it would have taken me 2 whole days to do before. So that if I work 6 hours a day, 5 days a week, I'm suddenly 4 weeks ahead. I mean, I've used up a month's worth of energy in a week. And I really have to be careful not to burn myself out using it.

PC: So there's really a greater intensity

working on the machine. NORMAN: Yes. The computer is the ultimate solution to that business of "I can't type as fast as I think." I feel the computer really is able to keep up with me, sa there's na resting at all. As soon as I think of it it's done. And so what I have to do is to be very careful. I have to consciously provide myself with that reflective time. the leisure that I used to get normally because I would be worn out physically from typing. Now I have to stop even though I am not tired.

PC: Some writers who don't use a computer feel you're going to lose a lot of time by trying to figure out how to make it work or by just fooling around with it and doing things vau wouldn't otherwise do.

NORMAN: Well, I don't awn any games. I've only done these two exercises in BASIC. And at the moment, for me, it is simply a tool. We have none of our finances an it. I don't have any of the cookbook programs.

But I'm very possessive of it. And when people come in and use it or want to play with it-uhhh! I mean, the hackles go up. I'm taking it up to the country this summer, and oh, the precautions we have made about that! We have sold this apartment and are moving, and I'm going to have a study on the roof of the building

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we're maying to, and I'm already real cancerned obaut the radiator and the humidity and the lock on the daar and all of

Working Miracles

PC: Do you find you have a different attitude toward work-that you want to sit down at the machine as appased to the typewriter?

NORMAN: It's o different ottitude taward revisian. I da love my work and I om quite equipped emationally to handle the salitude of it, so it is always exoctly whot I want to do in the morning. I always wont ta ga ta wark. But when I opproached revision, it used to be "Oh, Gad, here we go. How little do I have to do to accomplish this?" And naw, I laak at it-it's reolly given me a sense of energy about revision. because I know that I con work miracles naw in revision. Whereas befare, all I could hope for was adequate solutions. PC: Sa you dan't subscribe to the ald camplaint that the computer will take over your work by forcing you to work its

way?

NORMAN: No. I find that the camputer is the best warking campany in the warld. I mean, it's on ideal colloborator because it shows me immediately what it is that I hove done. I realize this is kind af anthrapamorphic, but I think of it os o fellow

think the world comes to me through my fingers.

warker. I think of the computer as "That's the brain that is writing it all dawn." And I da knaw that I hove o very personol relotionship to it. I think of it as the editor. and ascribe to it all kinds of humon avolities

entertaining WardStar cammands is Ctrl-OF. Becouse I think of the cursor sort of happing up and dawn—yau knaw, "Here it is! Here it is! I found it! Loak, it's right here! Naw what?" And I knaw that's just me wanting campany, wanting to hove o humon relationship instead of a mechan-

ical ane. I definitely think of the spotial organizotion of the computer's brain, almost like a neighborhaad, almast like an enarmous office. Todov we were tolking about nutting WordStar onto a disk emulator in RAM, and suddenly I reolized as I was talking about it that I had created this ather disk drive, this sort of invisible disk drive, that was lacated back deep in the heart of the machine.

But then, I think obout my own brain that way. I mean. I do think about it as an enormous office. You know, there are people who sit in the tiny room in the back, ond there are some folks who ore up in the front taking core of press relations. There's R & D and there's a basement Far example, I find one of the mast with cleaning people, and oil that. That's

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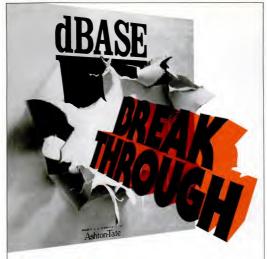
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just whot I do for entertoinment.

I have always thought about my mind as a magnificent piece of machinery. I've never thought of my mind as a kind of pet,

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which I think some people do. I meon, their mind is o curious sart of helper, but I've olwoys thought of it os just o mognificent mochine. So to pair it up with on equally powerful mochine that is copable of doing other things is not at all foreign to

Bad Command or File Name
PC: Communication—and the lack of it—
between human beings is a major concern
in your plays. How do you view communication between humans and machines?

NORMAN: I think there are some commonds that have been created in the world of computers to compensate for what we do so badly on human beings. It's o recognition of some real follures of communication between humans, and in a sense, I can tolk more clearly to the computer obout certain things than I can in the world.

I mean, the primory exomple is "Bod commond or file nome," which is simply the computer soying back to me "I don't know whot that is that you've asked me to do. I don't recognize it. I don't know whot to do with it. I would be happy to do whotvery our would like me to do if you will just tell it to me in a way that I understand."

Now, that situation orises among humon beings all the time. Someone soys to you, "Do you really want to go to the movies?" That is a clossic example of "Bad command or file name." You don't know whether the person is trying to find out whether you want to go to the movies, or whether they ret relling you that they don't wont to go to the movies, or or really interested in what you think of

oll. It is simply o real sloppy commond.

And I think that's foscinating. One of the
things I would like to do is think about
that whale list of cammonds that way.

But I find that I tend to do the WordStar D commond just in normal life. I mean, I will open o new file all the time. And I think, "I will just put this there." "Read-

ing in"—we do that in our experience. We will KR a previous experience into this moment and see how it offects us. We also KW—we save things for future use.

PC: The New York Times mentioned your knitting while the printer puts out copy and said "this juxtaposition of the technological and the homespun is a quintessen-

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tial nicture of this artist." Is it? NORMAN: Absalutely, But it was always true. I would be typing, and I would get up, and ta rest, I would go play the piana. I really think the world comes to me through my fingers. I like the feel of the keyboord, and I also like the feel of the varn and the needle.

Knitting is not quaint. Knitting is a string of knots, a character string, if you will. Knitting is a perfect demonstration of "the whale is greater than the sum of the ports."

Knitting is a binary operation, much like the camputer. You just hove these two stitches, combining over and over in vary-

ing ways. A sweater is simply a grid, with all the blocks filled in, much like a television screen It is less variable once it's finished, but much warmer. I'm interested in how things work, and sweaters, camput-

JE OF THE things the computer offers all of us is consistency.

ers, and canversations all wark the sam way-ane piece of information at a time

The Edge of the Universe

PC: Your first long piece was a book for a musical about inventors. Is that part al a technological bent?

NORMAN: It sure is. Take the zipper. It was invented by a fellow named Whitcomb ludson. It was the first unanticipated patent in something like 80 years at the potent affice. When it arrived, there was absolutely nothing that preceded it. There was no way to predict that suddenly the zipper would came into the world. It wos simply a guy standing there over his shaelaces one day, and saying, "There's got to be a better way to do this.

In the early days of Portapaks, I was a believer there, too, and spent three summers walking around the streets of New Yark with a Partapak, which of caurse weighs-God! And I was really interested

in experimental videa, and still am, although I dan't really do much in it anymore. But I'm a real appreciator of what can happen an electron at a time. I've said before that I'm mast camfort-

able on the edge of the universe. That is really where I like to be, I am happy standing on the beach for that reason. I'm honpy standing on the tap of buildings for that reason. I just like the sense that all out in front of you is just open and waiting.

And that's haw I feel about the memary of the computer. It's this great, vast blank space with nothing but power in it. All that is needed to make samething of that is me. And I can come in and in a sense shape that inner world of the computer and say what's gaing to be there. I like that



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something-from-nothing. Which is how it looks to me when I'm seeing NEW FILE. I mean, it's very exciting. I know that a lot of writers have a fear of the blank page. whereas that ta me is just thrilling.

Infinite Opportunities

PC: In 'night, Mother, lessie talks about her laneliness as a child. Do you see computers affering kids a kind of surrogate friend?

NORMAN: Absolutely. I heard somebady talking the other day about a computer program that's been designed to help ophasioc kids. And thank God somebady is warking there, because what thase kids need is direct, immediate, consistent feedback in order to develop speaking patterns that dan't exist noturally in their brains. In effect, you get sort of substitute circuitry, which would be thrilling.

I think that ane of the things the camputer offers oll of us is consistency, which we miss sa much in our encounters with humons. If I punch Ctrl-QF, I know exoctly what I'm going to get. I'm never going to set "I'm too tired, I don't feel like it." I never set anything other than exactly what Pun asked for

And I think that care in asking far the right thing and then finding that you get it back if you ask for it carrectly is valuable in human learning. I think camputers can teach a whale generation of kids that you must be very careful, you cannot eliminate a single step. A little mistoke can undo hours and hours of work-and this

'M A REAL appreciator of what can happen an electron at a time.

is something kids have not known in the last 10 years.

And the camputer gives infinite appartunities to do it right. This is personolizing ogoin, but I feel the camputer wonts me to set it right, and so is willing to allow me to try over and over and over and over again, and is in a sense encouraging me by its patience. Again, that's part of my peculiar, personal way of dealing with it, but it's very impartant to me.

PC: Jessie is isalated in sa many ways. Do you have any fears about computers increasing isolation between human beings?

NORMAN: No. I think what we are seeing is exactly the appasite. Computer technology is ollowing us to determine what our real needs os human beings are. Think af the medical advances, far example, that wauld never have been passible without the camputer. It allows us to know things obaut our environment that were really invisible before, in the same woy the electron microscape allowed us to see the atam. Naw we can see what really is selling in a retail store or which chemicals are really affecting the course of a virus. And in every way the camputer allaws us ta look more closely at our human environment, and asks us to be more humon. We con use the computer as a tool far expand-

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ing our own humanity. I think that's exactly what's hannening

I have spent the last 2 weeks with the computer doing this revision of the Shaker project. I know that at 4 o'clock this afternoon the composer is going to come, we're going to have a conversation that casts a reading next Thursday at 1 o'clock, and then 17 people are going to gather in this room and read that play. That would not have happened without the computer. I simply wouldn't have been able to do it.

Now, that's putting me more in touch with my human world. I wouldn't ever have answered all my Pulitzer congratulation letters if I didn't have the computer to help me. So in a sense, I am in increased contact, because it's easier for me to be in contact.

I can even concentrate better. Before, when I would type for 4 hours, I would always end up being just blind from the noise, and now I find that's not true. I can even walk out of the room and it can finish up all the letters

A Very Private Iov

PC: Do you find yourself wanting to spread the gospel according to IBM? NORMAN: What's sad is that I have nobody to talk to about it. I did get through a period where I was a terrible bore about it. And I find that I am now able to stop myself after the first four sentences and

HE COMPUTER allows us to know things about our environment that were

really invisible before. realize that nobody in the room cares, so I can just shut up. Now it's a sort of very private joy. I mean, I know that I do love it, but I don't need to go sell it anymore.

PC: Do you find other people who have computers are generally the only ones interested in listening?

NORMAN: Yes. The other night, for example, I was at a party. It was a glorious party; there were wonderful people there, dear friends and people that I didn't know. And I went upstairs to go to the bathroom, and I came out and the host's son was waiting for me. He said. "Come on. I've got a PC in here," and he had a color monitor and he had Flight Simulator. Really, this dear boy had waited for me to come out of the bathroom to show me the color bars, and I was just thrilled. When we come back downstairs, it was almost like we'd been out in the back smoking: "Where have you two been? You've been up with that computer. haven't vou?"

Portrait of the Artist as Hacker PC: How did you go about learning

NORMAN: Oh, it was just the most primitive approach. I read the description of

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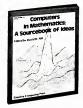
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the Ploy commond, ond, of course, I didn't understond o word of It. So I simply flipped back and forth through the BASIC monuol, looking up the words I didn't know until I got it to work. And then I spent o whole doy doing it wrong.

PC: The same with your typing program? You just hacked away? NORMAN: A true hocker. You hove to

understand, this typing tutor's not very sophisticoted. It doesn't sov. "WELCOME TO DANN'S TYPING TEST" and then cleor the screen. I meon, I didn't even know whot "cleor the screen" wos.

I would really love to be fluent in BASIC, and I would love to have onother whole life just to write longuoge programs-books with looped episodes, and crossword puzzles, and who knows what else? The technology is just waiting for us to figure out what to do with it.

PC: Do you have eny regrets or diseppointments about the PC?

NORMAN: None that I hoven't just token care of with the memory. I found Word-Star to be sluggish with just 64K. I really didn't like the WAITs, and I really missed being oble to go oheod ond edit while I'm printing. I would like to hove windows in WordStar, And I do hope soon there will

NE OF THE things I think I wish I haď is an absolutelu silent printer.

be a portable version that's compatible with the PC and corryoble, truly portable. I've looked ot the Compaq, and I just know that I wouldn't be able to lug it around the world

One of the things I think I wish I had is on obsolutely silent printer. The other morning, I ran off o copy of the Shoker piece, and spent about 2 hours listening, becouse I was sorting my mail at the same time. My eors were ringing for the rest of the dov. I won't ever do that ogoin,

I olso hove reol comploints obout the NEC ribbons. Somebody's got to moke o better ribbon. I meon. I hove o \$7,000 mochine, and it does not produce as pretty o poge os my old Electronic. And there ore people like me who are willing to pay whotever o corbon film ribbon would cost. But NEC only mokes this thing colled o reusoble film ribbon, and it produces this thick, old-style, nylon-looking print, and I om just not hoppy with it ut all

I om sure that there are probably printers that would produce what I want. I meon, clearly I get letters written on them all the time. But in this case it's simply o ribbon that's at issue. And I think that's probably o problem oll through the industry-tiny little things that are molly just oesthetic issues, but that ought to be considered, becouse there are those of us out here who core obout them. I do think there's o point where the big componies need to coll in people like us and soy, 'What do you need?'

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pointer, end record pointer only
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Computers and the Future

PC: Looking into the future, is there anything you'd really love computers to do? NORMAN: Oddly enough, I'm not interested in voice-octivated things. I don't know why that is, but that's prabably some writer voodoo that's left over and I'll set over that, too.

PC: You don't want to dictate and see the words up there on the screen?

NORMAN: No. I would like for there to be some fobulous longuoge programs. Those things—I mean, for Berlitz to go to programming—that kind of educational stuff I'd really be thrilled obout.

PC. Your PC. has appeared with you in the pages of The New York Times. How has instant celebrity affected your compute? NORMAN: Well. I had expected Dutle to get my tractor feed to me once they sow my picture on the front page of the Times magazine. I would have thought that IBM would be interested to know that their product was of such value to somebody like me. I would have thought they would know that the reol lostine cultural contri-

butions ore going to be mode by writers ond ortists using the mochines. And that they should moke them ovoilable.

You could make a major contribution to the literature of the country.

For exomple, one of the things that obsolutely ought to hoppen is that the Notional Endowment for the Arts, in cooperation with IBM, ought to be giving word processors to writers. You could do so much good simply by giving the machines oway. You could make a mojor contribution to the literature of the countribution to the literature of the countribution to the literature of the countribution.

try: it obsolutely ought to be hoppening. I'm reolly thrilled to see big computer programs in colleges. In my home town, Louisville, Kentucky, they did o survey and found out that the greatest single benefit that could accrue to the community by ony meons whotsoever would be computer literacy on the port of students. And so the Humana Cornaration, in cooperation with the lefferson County schools, is doing two really intense computer programs in elementory schools. I mean, here you have a city that has decided that the best single thing that could hoppen to this city is computer literacy for its children. And that's mognificent, isn't it? But the truth is, it's just being realistic; it's just being proctical. It is exactly what has to hop-

Editor's note: PC is hoppy to report thot Morsho Normon's NEC 3550 tractor feed orrived by press time, olong with o representotive from Dotel who repaired her monochrame odopter brocket. Normon sws she's 'thrilled."



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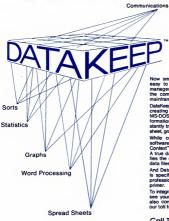
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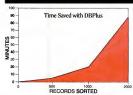
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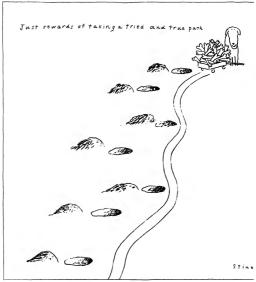
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Bottom Line Strotegist is designed to do one thing, projections of the profitability of start-up ventures and oew projects (see Figure 1). If you want to set up a computer-dating service, build a plant to make swizzle sticks, or just invest in someootelse's venture, BLS will take the financial assumptions you feed it and predict the consequences. It does this by means of sophisticated fioancial algorithms that are oot supplied by the user but are written into the program itself. Unlike conventional electronic spreadsheets, which require the user to build each calculation into a template before the program will do anything useful, this one has a complex template already built in. All it needs is a

USERS WHO don't bother to study the algorithms may be in for some rude surprises.

few values to plug into its international formulas before it starts splitting out oumbers and plotting curves.

This is the way financial software for microcomputers seems to be beaded—quick results and ease of use but with a loss of transpareocy to the user. BLS will calculate the oet present value of a project before and after depreciation charges eveo if the user has never heard of "oet present value" (NPV) and doesn't understand value" (NPV) and doesn't understand.

depreciation. Unfortunately, its Version.

10 is guided by some wrong-headed assumptions about real-world fioance, and it does a few tricks with taxes that would not amuse the IRS. Users who do no more than key in data and doo't bother to study the algorithms before using the results may be in for some rude surprises.

Making the Model

To run a projection, you simply type in all Key Business Assumptions: the number values that the BLS model oeeds to the valuate a project. Input is a snap. Assumed to the valuate a project. Input is a snap. Assume the entire program is menu driven (see Figure 2) and Hey messages will flap messages will familicance of an assumption (see Figure 2). These 31 numbers are the only information that can ever be fed into the project into that can ever be fed into the project of the second of the carefully as I try a sample roots of the carefully as I try as an account of the carefully as I try as an account of the carefully as I try as a carefully as

Let's say we are planolog to start a business to assemble miniature portable. TV sets. We will need to speed \$750,000 just to get started. That will include \$500,000 io tools, which we will depreciate to a straight line over 3 years and \$250,000 lo other start-up costs. The development period, during which we expect to have oo sales or reveouss, should be 4 months. Fixed costs, including tent, salaries, advertising, and other cowhead, will be \$60,000 a month, and each TV set we make will require \$25 to parts and materials. Weexpect to price the finished product et \$100 an each. However, we can probably unload only 200 the first month and expect it will take 10 months before our monthly sales figures reach counted at 25 percent and our tax metallocations. The control of \$100 to \$100

Let's use BLS to see what our company will look like in 2'vy years. We select e time frame of 30 months, type in A fjor "analyze", and BLS is off and running, It sends columns of numbers spinning down the screen, es it calculates monthly sales, revenues, costs, cash flows, asset book value, and nat present value. When it is finished, it can print out neet tables that summarize this information (see Figures 5 end 6).

During the 4-month start-up period, we have no revenue—only expenses. BLS autometically splits our \$750,000 initial costs evenly over the period. Even after sales get going in month 5, we have a negative cash flow, because our low turnover doesn't ellow enough

IN SPITE
of its speed and
attractive packaging,
the program suffers from
two kinds of serious
flaw.

profit to offset fixed costs. In month 11 we see a positive cash flow, and our ner present velue. Which has been steedily sinking, finally chenges direction. In month 21 we throw a chempage perty to celebrate our positive NPV. From there on out, it's all gravy. These turning points are highlighted, and some of our assumptions er displeyed in Figure 7, the BLS-generated Profitability Analysis.

Figure 1: A chort illustrating the financial model used by the Bottom Line Strategist.



Figure 2: The Moster Menu of Bottom Line Strategist



Figure 3: One of the eight screens used to input the 31 Key Business Assumptions: this one is for volues reloted to business growth. The Help key was pressed to display on explanation of the Length of Development.



Figure 4: A series of four screens disploying oll the Key Business Assumptions used to model o new business venture.









One of BLS's fleshiest faatures, though, is graphics. Once it has done tha meth, it can throw the rasults into snappy bar charts. It can take 11 diffarent variables, such as seles, costs, or asset book value, and plot them egainst time. These can all be graphed as

BLS HAS NO provision for ever actually servicing debt or paying dividends.

straight monthly deta, month-to-month change, month-to-month percentage chenga, or monthly cumulative totels (see Figure 8). All grephs can be dumped to the printer, where they come out es somewhat less impressive curves rether than true bar charts.

For our miniature television company, we have graphs of total revenuas (see Figure 9), cash flow (see Figure 10), and NPV affect depreciation (see Figure 11). Units are in thousands of dollars. BLS has en infly feature that lats you blow up any portion of eny of the charts second each third accrease in Figure 11 show the deta after zooming in on the break-even point around month 9.

So much for our ascapada in manufecturing. If we hed wanted, we could heve fine tuned the projection by estimating the collection period if payment is not received at the time of sele, the production and distribution lead time for our product, and an expected inflation rete. Our model could even have incorporeted an anticipated drop in variable costs, as our company moved out along the learning curve. Finelly, for any given level of estimated seles, wa could have calculeted our budget for optimum merketing according to tha Vidale-Wolfe model, if we understood such things as the seturation level of the merket for minietura TVs, the time leg between advertising and increased sales, and the incremental revenue brought in by each additional advertising dollar.

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Time for a Reality Check

All this is very razzle-dazzle indeed, especially when BLS is run on a color monitor. Unfortunately, there is rather less here than meets the eye. In spite of its speed and attractive packaging, the pro-

USING BLS is a little like shooting a rifle. Once you let fly, you have no control over the bullet.

gram suffers from two kinds of serious flaws. The first kind is inherent to the program's design philosophy. No doubt both for ease of use and to simplify the coding job, the authors chose to construct a financial and markating model in which Key Business Assumptions are fixed at the outset and may not vary thoughout the life of the projection.

These assumptions can, of course, be changed if you start all over from the beginning. The same projection can be revun in an infinite series of "what?i" cycles: How much do revenues increased; we can sell our TV for 65 113? How much longer until the break-even point if maximum anticipated sales are shaved sales are shaved as a constant of the contract of the development cats are cut by \$250.000 but the development cats.

a months?

I mouth of experimental tweaking life all fine and good, but using BLS is all fine and good but using BLS is all fine and good but using BLS is life. Uncertainty and the like shooting a rifle. Once you let fly, you have no control over the buillet. If the target is behind a tree, you can't make the built change course in mid-sit and fly and the built change course in mid-sit and fly and fire thousands of rounds, but you will never soore a hit. So it is with BLS you will all your values are set at the beginning and cannot be changed, Subsequent residually, but cannot be changed, Subsequent residually, but of BLS should allow greater freshibility, but of ELS should allow greater freshibility, but of existing the control of the should allow greater freshibility. So of existing the control of the should allow greater freshibility. So of existing the control of the should allow greater freshibility. So of existing the should allow greater freshibility than the should allow greater freshibility

For example, do you expect to buy additional machinery only as sales rise? You're out of luck. The model won't let you; you have to buy it all at the beginning. Would you like to dispose of some equipment after it's fully depreciated? Out of luck egain. In the model you can buy machinery but can't sell it. Do you expect borrowing costs to go down once sales begin in earnest? Too bad. Your cost of capital is fixed throughout the life of the

projection. Every one of the 31 assumptions you feed into BLS is just as rigid. Not a single value or tendency can be adjusted in midcourse. Inflation may not change during the projection. Sales may not drop-they must rise or hold steady. Perhaps worst of all, the tax rate is fixed forever, so you can't take investment tax credits or apply early tax losses to future profits-these are vital considerations in any start-up venture. The fixed rate elso means you can't figure a tax holiday, anticipata a rata change, or shift brackets. Corporate tax rates are graduated, just like individual taxes, and the maximum rete of 46 percent only kicks in after the first \$100,000. A new-ventures model should handle taxbracket shifts, but BLS doesn't.

Financial Realities

Even more frustrating, though, are the second kinds of flaws: those that might have been avoided even with a model that cannot reset values. One striking but evoideble defect is the model's interfame. BLS counts in months only account them no higher than 90. Although 5 years may be a long time in the software business, mineral extraction projects, for 15 years. Many occupants of the control of their sums monthly but break the year into quarters instead.

If need be, BLS can be fooled into doing quarterly projections by replacing monthly estimates with quarterly estimates and by multiplying all annual interest rates by 3. The results that the program thinks are

Figure 5: The Financial and Marketing report for the model company.

NOTION 11NE CHATEBIST (NE) TEL 1992 ECONOMETROC HOBELL INSINESS, FIRMACIAL AND INVASTING FORECASTS

	Reader of Cottomers	Number of treosections	Completive transactions	Total revenues	Norteting costs	lotet	Cosh	MPV before tax shelter
1		0	0	6.000	0.000	107,500	187,500	97,965
2				0,000	0.000	187.500	-127.300	175.151
3		0		0.000	0.000	107,500	187,500	-274.565
1				0.000	0.000	187.300	-127.500	-317.214
5	200	200	200	29,000	0.000	84,000	64.000	- 399.138
6	272	272	472	27,214	0.600	85.443	-38.229	-426 . 191
7	348	348	810	34.778	0.400	87,354	-50,578	-450-421
	493	473	1333	17.257	0.000	87.852	-44.573	-470,430
9	652	452	1985	65, 215	0.000	93.011	-27 .trzt	-464.703
10	851	651	2834	05.064	0.000	97.017	-11-731	-472-470
11	1099	1070	3924	189.639	8.000	101.908	7.231	-191,401
12	1349	1368	3294	134,807	0.000	167.361	29.115	-401.649
13		1676	4970	147.573	0.000	113.515	54-058	-462.000
14	2000	2000	8970	200,000	8-000	120,000	88.008	-432.448
15	2324	2324	11294	232,427	0.000	124-485	105.942	-373.007
14	2632	2632	13926	243.193	8.008	132,439	130,535	-344.765
17	2910	2710	14834	270.961	0.000	138-192	152.769	-298.709
18	2149	33 47	19965	334.934	8.000	142,983	171.931	-224.320
19	2248	3310	21333	334,785	0.000	154.757	187 - 828	-157.050
20	3547	3547	26840	350.741	0.000	150.140	200.593	- 84-223
21	3432	3432	30472	363,222	0.000	152.644	210-578	-14.973
22	3728	1729	34200	377.784	8.000	154.557	210.229	39.767
23	3000	3000	30000	300,000	0.000	156-000	221,000	135.294
24	3854	3054	41854	385.377	0.000	157.075	228.301	216.931
25	3893	3093	45747	389.348	0.000	157,879	231.477	294-426
24	3923	3923	49670	372.263	0.000	130.453	233.810	341.333
27	3944	3544	53414	394.392	8.000	150.870	233.513	435-648
29	3137	3939	57573	375-741	0.000	139.100	234.753	500.751
29	3971	3971	61544	397.045	0.000	159.413	237.652	561.307
30	3979	3979	45523	277.850	0.000	157.576	238 - 304	652 - 685

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	Deadine	3
i.	Suspended	3
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monthly figures are then actually quarterly figures. This is a clumsy procedure, however, and prone to error: I wonder why the authors didn't allow a choice of monthly, quarterly, or annual projection periods.

Another mystery is why the program does not report net income. Somewhere within BLS, this figure must be calculated for NPV purposes. While the user can graph such exotica as incremental marketing expenses or even contribution of depreciation charge-offs to NPV, he will look in vain for a simple statement of

after-tax profits-a perplexing omission. Worse than perplexing is the absence of any means to remunerate capital. The manual explains that cost of capital is cal-

culated by taking the after-tax weighted average of the costs of debt, equity, and retained earnings-a difficult and uncertain business, by the way. Then, quite properly, it uses this figure as the rate at which it discounts future cash flows. However, BLS has no provision for ever actually servicing debt or paying divi-

In the real world, shareholders may

BLS can't tell the difference. Furthermore, since cost of capital is so notoriously difficult to calculate, many small companies bypass it entirely when evaluating new projects. Given anticipated cash flows, they solve for the discount rate that will produce an NPV of exactly zero, a value called the internal rate of return (IRR). The higher the IRR, the better the payout. This way, a company that has only a hazy notion of its cost of capital can compare similar projects and choose the one with the highest IRR. This type of analysis has limitations, but there are hand-held calculators that compute this value, even for projects with variable cash flows. It seems a shame that BLS can't get the IBM PC to do the same.

sometimes have to wait for their dividends, but bankers get very nasty when customers fail to service their debt. A financial model that does not even permit interest payments, much less principle repayment, is gravely defective. One way to fudge a solution might be to include remuneration of capital as a fixed expense. Unfortunately, we are not allowed to have fixed charges until after the deveiopment period, which we could very well have financed with debt. Furthermore, interest payments are tax deductible, whereas dividends are paid after tax, and

LS ASSUMES that you are going to break the law.

Another strange oversight is the lack of any opportunity to reinvest positive cash flows. Classic NPV analysis olwovs assumes the businessmen are at least smart enough to buy Treasury Bills if they have cash lying around. BLS assumes nothing

Figure 6: The Depreciation and Tax Shelter report for the model company.

ROTTON LINE STRATEGIST (TK) (C) 1982 ECOMOMETRIC HODEL: BUSINESS, FINANCIAL AND MARKETING FORECASTS

ion th	Dook value of assets	Depraciation tex shelter	MPV before tax shelter	NPV after tax shelter
1	121,250	1,875	-92,945	-91,107
2	238,750	3,750	-185,151	-177.614
3	352.500	5,425	-276,565	-265,560
4	462,500	7,500	-367,214	-343,987
5	447,500	7,500	-398,130	-372,749
6	432,500	7,500	-426.189	-373.721
7	417,500	7,500	-450, 421	-411,133
8	402,500	7,500	-470,488	-424,046
9	387.500	7,500	-484,702	-431,371
10	372,500	7,500	-492.070	-431.915
11	357,500	7,500	491 401	-424,486
12	312.500	7,500	-481.619	-408.037
13	328.437	7.031	-462.088	-392,258
14	315 - 312	6,563	-432,468	-346.887
15	303.125	6.094	-393.087	-302.218
16	291.875	5,625	-344.765	-249.060
17	280.625	5.625	-288,709	-138,213
18	269.375	5,625	-226.328	-121+086
19	258 - 125	5.625	-159.058	-47.115
20	246.875	5-625	-88,225	26+374
21	235.625	5.625	-14.973	104.240
22	224.375	5.625	59.767	183.549
23	213 - 125	5-625	135.260	263.570
24	201 .875	5,625	210.951	343.745
25	191.563	5-156	286.426	423-291
26	182.188	4.687	361.383	501.915
27	173.750	4.219	435.608	579.410
28	166.250	3,750	508.951	655.431
29	158.750	3.750	581.307	730.839
30	151.250	3.750	652.609	304.965

of the kind. It does allow you to input a value for the prevailing risk-free interest rate, which one would naturally assume is the rate at which cash-on-hand is to be reinvested. Well, it's not. BLS would even let extra millions lie idly in the till. The risk-free interest rate is only used to calculate NPV after depreciation charges.

Another bizarie feature of the BLS financial model is the way it handles inflation. It allows you to anticipate an inflation rate and cost to linewast at different many costs to the cost of the property of the the cost of the property of the property of the property of the property of p

BLS is not, however, ignoring inflation, if prices and costs are increasing at different rates, cash flow and NPV will be affected, and BLS correctly displays these new values. In other words, to arrive at inflation-adjusted cash flow and NPV, BLS has probably calculated inflation-adjusted costs and sales—it just doesn't display them. Why not?

Yet another unnecessary defect is the requirement that all capital equipment be depreciated identically. You can't break out 3-year machinery and depreciate it faster than 15-year real property. Nor can you set different salvage values. The BLS

ANYONE WHO has seen how a

mainframe can run the numbers is still likely to think this program is a

manual claims, on page 110, that this restriction "minimizes detailed analyses ... and tends to overage out errors." (The italics are theirs.) Oh dear!

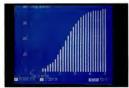
Finally, and quite spectacularly, BLS assumes that you are going to break the law. When you buy capital equipment at Figure 7: This summory of results oppears on the screen ofter oll the colculations for the Profitability Analysis are completed.



Figure 8: The Business Forecosts Graphics Menu con be used to generate bar chorts of doto colculated in the Profitability Analysis. On this screen the Total Revenue option [3] has been selected. The next keystroke will choose the range of value to be displayed in the chart; the options are listed in the lower right hand corner.



Figure 9: The screen display of a bor chart showing the monthly values of Total Revenue for the model company.





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the beginning of a project, it expenses the entire cost during the first month in service and then calmly proceeds to depreciate the equipment over its estimated useful lifetime. Now that really is a neat trick; if you actually try it you're likely to go to work one morning and find a United States marshall putting a padlock on the

Strategists for its screen displays.

Time in months

door to your fectory. This kind of monkey business would show up immediately if BLS reported after-tax earnings. Since it doesn't, it takes a little poking around in the financial algorithms to figure out what's going on. Surely Ashton-Tate doesn't endorse cooking the books, but its best-lesters seem to have been asleen at

work one morning and find a United doesn't endorse cooking the books, but its States marshall putting a padlock on the beta-testers seem to have been asleep at Figure 10: The printed version of the chort of monthly volues for Cash Flow. Note that

CASH FLOW Cash flow 300. 200. 100.

the graphics in this printout are less sophisticated than those generated by Bottom Line

the keyboard on that one.

A New Model

Well, what can we expect from the soon-to-be-released Bottom Line Strate-

THE BOTTOM
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chiv.

gist Version 1.1? One obvious improvement that the authors have promised is somewhat greater IRS compatibilitydepreciable equipment will not be expensed. Version 1.1 should also be integrated with dBose II, so that data files can be transferred between the two systems. Ashton-Tate also promises some rudimentary spreadsheet capabilities that would permit additional values to be derived from BLS output. We might even be able to calculate net profits. The program should also make better use of the Enson printer's graphics, so we can expect true bar-chart printouts. Finally, it sounds as though it may be possible to add certain specific expenses and revenues at points along the projection path, but BLS 1.1 will be far from allowing us to reset values en route at will. Anyone who has seen bow a mainframe can run the numbers is still likely to think this program is a toy.

Apparently, there is a Verriera Z.D in the works even now, which should come close to approximating the real world. It may be a while, though, before we can remunerate capital, reinvest positive cash may be a while to the control of the suthern of the program is right when he describes BLS as "in electronic back-of-the-envelope." Of course BLS on the box of an end of the control of the control

Capabilities Versus Omissions
There's cause for reflection in all this.
For most of us, computers will always be

30

mysterious black boxes, their inner workings a marvol. This is as it should be; what a microprocessor actually does to earn list keep is of no real concern to us. For those who don't understand finance and who haven't the time to learn, the Bottom Line Strotegist is a box as black and as mysterious as an 8088 chip.

But software is different from hardware. It is vital that users understand the criteria by which a financial model evalu-

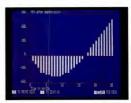
IN 1982 there were 25,346 corporate bankruptcies in the United States.

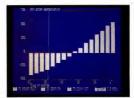
ates a project. As we have seen, the Bottom Line Strotegist performs its wonders in mysterious and sometimes questionable ways. We shouldn't expect the BLS manual to teach us enough about finance so that we can figure out the model's limitations for ourselves. Nevertheless, we would be more honestly served if the manual included a sober list of things the program can't do rather than constantly conratulatine itself on the thins it can do.

So, what are we to make of the Bottom Line Strategist? The authors drop us a hint. "We invite you to explore the liberating and joyful world of strategic financial-and-marketing planning," they gush. in a lyrical passage from the first screen in the Executive Overview. Liberating and joyful? In 1982 there were 25,346 corporate bankruptcies in the United States. Maybe some of them were caused by managers who thought they wouldn't have to pay interest on their loans or who tried to depreciate equipment after they expensed it. It's a tough and dangerous world out there, and it's not easy to be sympathetic towards a program that trivializes the risks.

Jored Toylor is o former loon officer for Monufacturers Hanover Trust Company. He is also outhor of Shadows of the Rising Sun: A Critical View of the Japanese Miracle, which will be published this foll by Williom Morrow & Co.

Figure 11: Charts of the manthly values far net present value (NPV) after depreciation. The series of screens demanstrates the program's ability to zoom in an a section of any bar chart.











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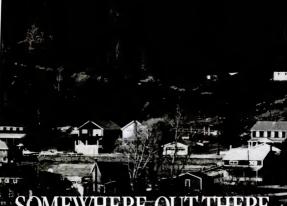
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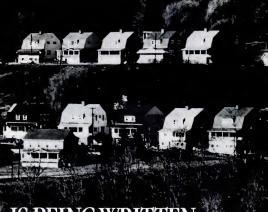
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What's black and beautiful and 15 inches long? And so crammed with futuristic electronic devices that it looks like something Luke Skywalker would use to destroy an evil civilization?

Picture this: Five captains of industry file into a losh boardroom; the deal they plan to cut will plan to cut will plan to cut will plan to cut will put a server hiccup in this year's graph of the GNP. The first one polnts almost imperceptibly to a sipot on the sleek Brazillian roseawood table as two diele scurry to dientangle a PC and its knot of cables from a dolly and sei tit up in front of him. The second befts a Compseq to the work surface and pops the plastic keyboard noisily down.

The third unfurls a TRS Modal 100; at the sight of the word "Shack" emblazoned on its case, the others in the room immediately dismiss him as a loser. If he wore in Japan he would commit hara-kiri on the spot to save face. The fourth deftly uncrates an IBM look-alike, and spends the naxt 10 minutes trying to get it up and running with a tall stack of IBM-incompat-

ible floppies.

The fifth reachas for a thin, elegant attaché case, swings back the unborn-vicuna leather top, and slides out his Grid Compass. The others all drop dead. I mean, for \$8,150 they should.

THE GRID IS the ultimate status computer, a real headturner, the Bugatti of bits.

Bugatti of Bits
The Grid is the ultimate status comput-

er, a reai headturner, the Bugatti of bits. Put one down in the middle of a DP crowd and from the ensuing buzz of appreciation you'd think Nastassia Kinski had just dropped in with her snake. At the last few

computer shows you could pick out the Grid booth instantly: it was the one that always resembled the IRT subway at 5:15 p.m. on a Friday.

Why all the fust? It's a class act all the way. Other so-called portables fall into one of two categories. Some have full 80 × 25 character displays and adequate mass storage devices, but usually resemble hulking sewing machines, and are about as easy to schhop around. Most of tha rest sport squinty 8-line liquid crystal displays that you have to angle properly to read, and have procious little permanent memory or storage.

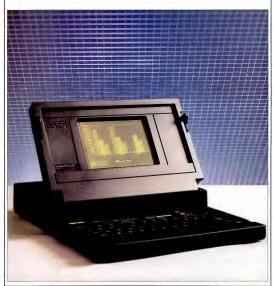
Why aren't there very many true portables that will tuck neatly under your arm, give you bright 80 × 25 displays under any lighting conditions, and store a double-sided disk's worth of files in their bellies? Easy. Money.

The Grid's celebrated flat panel display alone is said to have cost its parent company \$700 a pop when the unit was first introduced: the price has subsequently dropped a bit. And the three little segs of magnetic bubble memory tucked inside aren't cheap either. Neither is its miniaturized high-speed modem.

So while portables have been proliferating lately like bunnies, none can metric

HARDWARE/PAUL SOMERSON

16 bits never looked so good. This elegant portable boasts an 8086, an 8087, dazzling graphics, unmatched communications hardware, and MS-DOS. It's very hot, in more ways than one.



PC MAGAZINE 323 AUGUST 1983

the Grid's pricey innards. Or want to. After all, how many big spenders are going to plunk down more than 12 thousand clams for this sexy black machine and its companion hard/flappy drive. Virtually all the other vendors on the market are aiming low.

Tied Down

This wasn't the only reason most systems manufacturers weren't worried. Grid originally designed its computer to plug into a national network named "Grid Central." The idea was that an executive could toss his computer into a briefcase (and still have room for his personal papers), fly to a meeting, dial up the network, then pull in and send out his files from that remote location. The only trouble with this is that most computer users prefer independent operation to what industry-watchers have called "the telephone umbilical cord."

Grid finally recognized this, and in June made a partially-IBM-compatible MS-DOS available in addition to its own less common Compass computer operating system (CCOS). This development may save the company from becoming an



Main Grid program menu. Programs are selected by maying a box up and down the list of choices using the cursor arrows.

interesting footnote in the history of microcomputer marketing, although many analysts feel its Tiffany price and selective marketing strategy may have the same effect.

Compass has already released DOS 2.0 versions of MultiPlon and WordStor, and will soon make available customized versions of dBose II and Condor. Microsoft BASIC is available in its interpretive and compiled flavors. Grid owners can also expect to see Microsoft's COBOL, Pascal, FORTRAN, and C. along with a Business BASiC compiler. And Compass will pro-

vide file transfer utilities that let CCOS handle MS-DOS data.

The Grid was originally designed to run under the company's proprietary CCOS operating system. MS-DOS and CCOS may co-reside in the Grid when it is running, but programs written under the different systems can't be stored together. Standard CCOS applications include a spreadsheet, database manager, word processor, graphics generator, and both DEC VT-100 and iBM 3101 terminal emulators. CCOS also supports GridBASIC, Pascal 86, FORTRAN 86, and PLM 86.

Navigation Aids

Most of the Grid's programs share the same set of commands. Compass calls this "Leveraged Learning," and it does tie all the programs together fairly well and



The Grid's full-screen analog and digital clocks. Note the sweep hand marking off seconds.

allow users to move from one operation to another quickly and almost automatically. You can boot up, leap headfirst into a spreadsheet, toss a few cells around, tap the keyboard once or twice, then sit back and watch as the screen fills with presentation quality graphs and charts. And it's just as easy to stroke the keys once or twice more and send your data to another

The idea behind Grid Central is interesting in a space-age sort of way. You can talk to another Grid user across the street via a mainframe located in Mountain View, California, if you don't mind the phone bills. You can talk to another user across the hall using an internal Compass Central table-top computer-cum-network that can splice together up to 32 Compasses and a host of shared peripherals. If you can afford it, you can even string together mainframes, printers, data banks. and dozens of individual Grid work sta-

tions scattered across six continents.

When all the wires are in place, the whole network becomes the "Grid Navigator System," (Compass . . . navigator, get it? if this all sounds a bit confusing, it is. In fact, the folks at Compass are changing the

A.OSED, THE Grid looks like a lot of things, but a computer isn't one of them.

name of Compass Central to "Grid Local." which is only slightly less perplexing.) These guys are really on top of the micro world: their Compass Central box is built around Intel's next generation 80186 chip; in fact, each CC contains several of these chips to support centralized resource sharing and communications serving.

You have to admit, the idea is very sexy, conjuring up pulp-tech images: lames Bond creeps into a telephone switching center in a steamy Jakarta jungle, whips out his Grid and twists a phone line Into the back, dials a sophisticated SMERSH timing device on his screen, and defuses H-Bombs ticking down to zero in



Sample "Widget Alpha/Beta/Gamma" spreadsheet. Graphs in the accompanying reproductions are based on its numbers

every Western captial. (Maybe this isn't so farletched: One of the company's four regional offices is in McLean, Virginia-America's highest-tech spy city.)

And that's the feeling you get using one. One reason so many evebrows go up and jaws go down when a Grid comes into the room is its styling. It screams expensive. The pixel-perfect bit-mapped 6-inch

amber display with its lickity-split 66 Hz refresh rate, the sleek black magnesium case, even the way its knurled knobs click it open and shut, are all diabolically impressive. The thing drips with subliminal cues that whisper "take me home . . . " (or rather, "take me to your office . . . ").

Under the Skin

And it's no slouch inside, Beneath its matte magnesium skin beats an honest-togoodness 8086, not one of your garden variety 8088s that will soon be showing up in bins on Canal Street under handpenciled signs that say "Any 4 chips \$1." The 8086 nestles against an 8087 floatingpoint prestidigitator. These two chips power a handful of dazzling sampla Pascal plotting routines that flash across the screen so fast you think you're in graphics heaven

Tha Grid's three bubbles can salt away

puter insida. Or for an exacutiva who wants to sling one under his arm and walk through a tough neighborhood. Without the dangling power cord, and with the top down, it halfway resembles a trendy designer's silverware chest

To operate it with MS-DOS loaded inside, you squeeze the knurled knobs forward and pry open what appears to be a large set of hippopotamus jaws at the business and of the unit. Press the rear rocker switch and you are greeted by a soft gurgle and the glowing orange message "Booting MS/DOS from b" on the otherwise dark screen. The R: drive in the configuration we tested stood for bubble. It's floppy was

set up as A: and its hard disk as C: If the Grid is not connected to the floppy/hard disks via its IEEE-488 General Purpose Interface Bus (GPIB), the screen clears, then lists the attached devices, in our case:

guassed, the Grid won't run most PC software straight out of the can.

Diamonds Take Forever

The keyboard is decent-things are generally in the right place, although the numbers in the top row have to do doubla duty as function keys, and there is an additional control key named "Code." The four cursor arrow keys are in the upper right hand corner of the board, and are arranged in a diamond, both of which make life easy, right?

WordStor doesn't think so. Hit the cursor mover arrows and all you get are rows. of brackets and capital letters. To use this version of WordStor you have to rely on the old-fashioned Ctrl-plus-E/S/D/X diamond. The Ctrl key is conveniently located at the extrema lower lefthand corner of the board, which means the little fingers of your left hand won't hit the shift kay



Clustered bor graph with background of horizontol lines. Note grid menu in window at bottom.



Clustered bar graph with bockground of



been removed

384K of files, giving you more than a double-sided disk's worth of nonvolatile bytes at your fingertips. You also get 256K of RAM, a 300/1200 band modern, IEEE-488 and high-speed (625 Kbyte/sec) peripheral buses, and a grab bag of other surprises, all wadged inside a chassis a mera 2inches thick, 111/2-inches wide, and 15inches long. All this hardware throws off heat like a Franklin stove. In a pinch the underside of the unit could double as a Griddle; make mine sunny-side up. That's what happens when you cram a gadgetheavy PC into a package 1/11 its normal size.

Closed, the Grid looks like a lot of things, but a computer isn't one of them. This is good, I suppose, for the shock value when you flip up the screen and bystanders suddenly realize there's a comGPIB Rubble

Floppy Disk [same as bubble]

No HardDisk then, lo and behold, the semi-familiar: MS-DOS version 2.00

Copyright 1981, 82, 83 Microsoft Corp.

Finally, it asks for the date and time and then sits there with a cursor unblinkingly tetharad to a B> prompt.

From here on out it's pretty much straight by-the-books alien MS-DOS, Except for the fact that the latters are tiny, flat, and orange, you'd swear you were looking at a Lilliputan black IBM PC. Ours came with WordStor (version 3.3, no less, at a time when all you could gat in stores when you asked for this was 3.24 and a blank stare). However, as you might have half the time it reaches for the Ctrl, the way it does on the PC. Perhaps this is all because WordStor announces it thinks the Grid is a DEC VT-100.

WordStor on the Grid is so s...l...o...w. In a precision timing tast performed with a wristwatch and an assistant, from the time my finger hit the Return key after typing WS, to the time the WordStor opening menu sattled down on the screen, the Grid took a whopping 22 seconds, the PC a mere six. And when I loaded WordStor. onto the PC's electronic disk, it took a lightning two. Everything else about the Grid's WordStor other than the speed at which text could be entered was equally slow. Is this what a busy executive wants?

To load files and programs into the bubble you can use either the GPIB line to the disk drives or the modem. To boot off the floppy, you turn the whole works on and hold down the F key within 2 seconds of hitting the power switch. I would have preferred a menu that asked what I wanted to do and then did it real fast, especially since practically everything else is menudriven.

When you boot off the COOS flaggy you see nothing on the screen for about a minute except a thin one-pixel border around the edge and a tiny block character sensaphore in the lower right-hand corner. Then the date and time busing up along with the time was about 4 hours fast I7 hour fast by west coast standards! Ours was "Version 20.4 of Navigator Interface" of any up to the control of the control of the grams. Interestingly, while COOS can not battery powered clock. MS-DOS cannot.



Segmented bar graph.

You can't get to first base with MS-DOS until you either fill in the new date and time, or hit the Return key twice.

You make menu selections by hitting the appropriate curror arrow key, liftting the CODE+Retorn keys enters your choice. Each main menu selection leads to a higher-level menu. The first one the manual wants you to ty is called "Set-Time," which turns the screen into a very round face and a sweep hand. If you are a true child of the computer age and don't know how to tell time from a conventional dial, there is also a small digital clock at the very bottom of the screen.

To find out what options each of the Grid programs offers, you simply type CODE+?, a very nice leature (except that you actually have to hit a third key, the Shift, since? is uppercase.) This gives you access to another menu: hit CODE+O (for

Options] and you can change the hour, minute, day of week, etc. One conlosing aspect is that there is no menu selection to return to the main menu; you do this by "quitting" whatever you're doing. To the menu's credit, there is always a check to make sure you want to quit so you don't lose data by hitting the wrong key.

Tops in Plots

One of the things the Gold does best is turn its conventional spreadshees (which it calls workshees) (not graphics. Its Gold Pot oillity is tope. With two or three keystrokes and a very simple menu you can be present the conventional control of the conventional control of the conventional control of the conventional conventional control of the conventional control of the conventional conventional control of the conventional conven

But GridPlot dossn't begin to tap the incredible graphics potential of the unit. Compass sent us six graphics deemso that stop passersby in their tracks. The first is simply a screen of 13 or 14 little circles that explode like a rack of pool balls and bounce off the walls in effortless elastic collisions so fast and clean you'd swear you were staring at an animation on film or videotage.

Other samples give you a blazingly fast arabesque of twisting fractal geometry (called, oddly enough, "Hilbert"), a re-



Line graph.

peating pointillist spray of loops and whirls, a hypnotic twiling phantasmagoria I can best describe as zooming wheels within wheels (stars actoally), a spinning circular latticework web, and a magical dancing loom of swooping curvilinear planes at crazy angles that resembles a

special effect the U.S.S. Enterprise flew through once on its way out of a time warp. What makes these demos so remarkable and worthy of the gushing paeans above is their startling speed and the awesome spidery tracery of etched amber lines assainst the flat back screen.

and spanish turk ware that center with the basic package is the COSs operating system and its Novigotor package, and COSS BASIC Lifyou ward MS-DOS, you pay Grid \$150. Its Interpretive MS-BASIC, \$350. to Interpretive MS-BASIC, \$350. to Certifing to Grid spokesman Andy Danwer, you can thuy offorwar anywhere dies that most a part of the Compass vocabulary, the company receils at the notion of selling either its sleek black machinery or its customized canned software at anything contributed canned software at anything either its sleek black machinery or its customized canned software at anything contributed canned software at anything canned cann



Pie chart.

below list. So il you want MultiPlon, you fork over \$275; MS Pascal or FORTRAN, \$500; WordStor, \$495; dBose II or Condor, \$695; and MS-COBOL, \$750. I predict that Grid Systems will not sell an awlul lot ol COBOLs. You heard it here first.

Many purchasers do buy four of the most popular nine CCOS programs (which the company refers to as Management Tools), GridPlon, -Plot, -Fife, and -Write. at a special package price of \$940. The word is that some of this software-perhaps the lour popular packages abovewill soon be sold bundled with the bardware. Most of the other Tools are terminal emulators, which should sell moderately well, especially for the company's IBM 3101 package. A trim, rechargeable, 1 × 4 × 6-inch black battery pack will soon be available to keep the computer huffing and puffing away from its 120 volt lileling for an hour. No price has been announced lor this predictably popular accessory, which a Grid staffer described as "very

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appealing to executives—the size of a hip flask." And Grid sells an adapter that plugs a Grid into, your car's cigarette lighter so busy executives can make every stoolight count.

I Am a Camera

The editors at PC came up with an application that may generate interest among Cofd users. Executives, it seems, are always looking for presentation-quality graphs and graphics in a hurry. For most, this means hiring expensive editors, or purchasing a separate image camera with its own fits panel CXT inside. Such cameras can cost \$5,000 or more [see with its own that panel CXT inside. Such cameras can cost \$5,000 or more [see with its own that panel CXT inside Such cameras can cost \$5,000 or more [see with its own fits of the seed of the cost of the seed of the se

We set up a 35mm camera in a darkened room, on a tripod about 15 inches away from the Grid, and made sure the film plane was parallel to, and centered in front of, the Grid's crisp, pancake-flat, monochrome screen. We shot several rolls of Polaroid's instant 35mm Polachrome slide film, at ASA 40, with exposures bracketed between a quarter and an eighth of a second.

The results were sharp and impressive—and exceedingly fast. We were projecting finished images 10 minutes after we booted the computer. For businessmen who like dramatic visuals this can be a plus; they can have dazzling charts and graphs up on a projection screen minutes after working out the numbers.

High-Finance High-Tech

Grid Systems Inc. was founded by entrepresser and former Xerox Advanced Office Systems Group Menager John E-lendy, who raised the ancessary start-up money in two lighthing attacks on Well Street's venture capitalists. Ellendy apparently convinced wealthy institutional Fundamental Conference of the C

best parts money could buy.

Executives were pictured as frequent travelers who liked to work on the run, and who would appreciate an elegant package they could carry home on week-

THE COMPANY recoils at the notion of selling either its sleek black machinery or its customized canned software at anything below list.

ends themselves. And, as one Grid staffer put it: "Business is a poke game, substitution of the and status contribute to an executive's substority and can help turn a bordische deal fait way. And executive all believe that when It comes to expensive electronics, good things come in small packages." Whatever Ellenby said esemts of the substitution of the way worked; his investors put up \$13 million to get the ball rolling, it didn't hut many of them also got a seat on the comnancy's Board of Derectors.

The menagement raided Apple Computer, Hewlett-Packard, IBM, and Xerox to staff up. Engineers from HP cobbled together the basic hardware, and savants from Apple and Xerox its software. Ellenby's most recent coup was to snatch Deve Hanna, former VP of IBM General Offices Systems. Hanna, now President and CEO, was tapped to "take Grid rapidly to the \$100 million milestone and beyond" in the words of Ellenby, who remained company Chairman. Hanna had been responsible for marketing IBM's small systems. communications systems, and office systems to the nation's 2,400 leading corporations. He had also been a nuclear wespons specialist in Vietnam. A word to the wise competitor.

Grid vs. Gavilan

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George Moorn, Product Manager at Gavilan Computer Corporation gives the Grid mixed marks: "The Grid's electroitmanscant screen is a particularly elegant solution to the need portables have for a flat panel screen, and its packagine speerally very elegant. It has a very complete set of application solvare, and its graphter package is particularly good. The comcurs. It has an excellent communication package, aspecially its 3270 interface. And its 8007 is also a piux.

"But we believe that the Grid has saveral severe problems. It claims to be a portable but has no removable media. The Grid, of course, hooks up easily to its own hard and floppy disk drives, as well as to any standard telephone, I Our unit has an integrated microfloppy. Their has a temperature problem. It still requires an operature problem. It still requires the Grid Central or plugged into a wall. The price of the standard Grid configuration is vary high—and even higher when you have to run industry standard MS-

DOS programs. Their software is not truly integrated [Ed. note: Grid would dispute this charge], and they have nothing to match our solid state mouse, which Gavilan owners can use as a cursor mover or a selection device."

"Compass is right on the seam between the portable and the office market, and as long as they remain there, they will be unable to penatrate aither market effectivaly." Moore may have a point, but the folks at Grid are finding ways to make the Compass both more portable and batter suited for office work.

The basic Gavilan sells for \$3.985, not in truly portable. For half the price of a stripped-down. Grid, you get a battery-operated computer with a recharge state truling crystal display (LOD), an RS-232 port, a built-in 3-inch 360K (formated) microfloppy side drive, a built-in 300 build modem, and a video moiltor inter-face (RF modulator). You also get the Gavilant's proprietary operating system, as well as its interprated word processor,

spreadsheet, asynchronous data communication packaga, and Portoble Secretory (an organizar, scheduler, and ticklar file)—and they throw in MS-DOS 2.0, an MBASIC interpreter, and a crushed velvet carrying case.

Or you can buy one fully loaded for \$6,225, which adds on the company's 985 printer (using thermal ink transfer tech-

THE SERVICE people all sound bouncy, cheery, well-scrubbed, as if limned by Norman Rockwell.

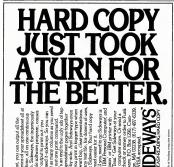
nology that Moore claims will allow letter quality characters on bond or thermal paper), a second floppy driva, and an additional 128K RAM. The bare bones Grid, on the other hand,

costs \$8,150, and for that you get tha vaunted screen, 256K RAM. 384K of bubble storage, a true 16-bit 8086 chip and its floating-point 8087 coprocessor. a RS-232C and RS-422 interface, as well as an IEEE-488 bus, a 300 and 1200 baud modem, and tha shilly to hook into the Grid network. Grid's combination 5½-inch 10-mesa-

byte Winchester and SV-inch double-sided floopy will run \$4.100. Its floopy as \$4.00. Its floopy as \$4.100. Its floopy as \$4.00. Its floopy as \$4.100. Its floopy as \$4.00. Its floopy as \$4.000. Its floory as \$4.000. Its floopy as \$4.000. Its floory as \$4.000. It

Absolutely, Positively Broken

When the Grid was first announced, Compass planned to sell directly to Fortune 1000 companies and government accounts, and forego the normal retail channels. Sales were ... modest. The company recently launched a national retail marketing program, through statusconscious chains such as Businessland.





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PERSONAL PRINTER CIRCLE 257 ON READER SERVICE CARD Computerease, Simtec, and Computerworks. Compass executives claim they are now selling "saveral bundred per month" and are "very pleased at the 50 to 100 percent growth per month."

One problem about buying through a dealar is that you won't be able to sign up for Grid's unprecedented service contract. Costing about 1.5 percent of the total system purchase price, Grid's own service will guarantae a working machine in your hends within 24 hours of your panicky call. It does this by maintaining a supply of loaners at the Federal Express nexus. The Fad Ex man shows up the next morning with a new computer and takes your broken unit eway, even if you live in a yurt in the Montana outback. Buy from a dealer and you get yours fixed by the dealer.

Either way, once you're a registered Grid owner you can call Compass's Mountain View customer service hot line from 6 a.m. (California time) to 6 p.m. and have some of the friendliest telephone service people in the business step you through a problem. From this and of the connection

thay all sound bouncy, cheary, wallscrubbed, as if limned by Norman Rockwall. They almost heve to be, since meny purchasers are company presidents who don't want to hear a snarling moron tell

purchasers are company presidents who don't want to hear a snarling moron tell them to read

the manual.

tham to read the manual. You can also buy software from the mein offica over talephone lines; you simply yank tha wire out of the back of your trimline, snap it into the Grid, and you're in business. If you nead a program in a hurry, this is hard to heat The manual of course comes later Dozens of chief executives are taking

the plunge. After ell, if you beys the monay, why not get the best, and for quality of construction and design, and ganaral performanca, this computer beats the other portables hands-down. So are wall-to-do professionals ettracted by its sexy looks. and ist-hopping financial types who appreciate the 8087 they can plug in on the Eastern shuttle or the red-eye Washington Metroliner. And there are many other sat-Isfied customers, including e matropolitan polica force that uses Grids to file onthe-spot reports.

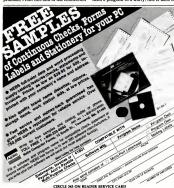
Truly Seductive

What does this all mean? The Grid is a superletive piece of engineering end styling. It would look good on a bare \$20,000 desk. In fact, it would make the desk look batter. Evary one of its features is kid glove quality. For certain complax numerical and graphic applications it wipes up the floor with the competition, including IBM. And its communications abilities ere hard to best

Grid is making changes. It plans to offer an updated version with very large scale integrated circuits (VLSI) that will beat the heat. The new Grid may come bundled with some of the spiffier software available. And the company is working to expand its product line.

Thare's no doubt about it. The Grid is e phanomanon. Crowds formed immediately wherever I switched it on. Computer mayens were awastruck by its graphics, its siza, and its nonpareil chips. Computer illiterates were just plain dazzled. It could stand a bit of tinkering, so you could put it on your lap and not burn a bole in your worsteds, stora a bit more in an additional bubble or two, operate it longer without the umbilical to the nearest wall, and speed up some of the slower initial operetions.

Ok, so it hes a few drawbacks. But it is a truly seductive hunk of precision machinery. A nice piece of work. I hete to best the car mataphor into the ground but the comparison is apt: It really does remind peopla of e prestigious, streamlined, hendtooled European sports car. It's nimble, gorgeous, responsive, very sexy. And it really moves when it's in the right hands. Don't get me wrong. I'm not complaining about my PC. But if someone offered me a Grid I'd snap it up.



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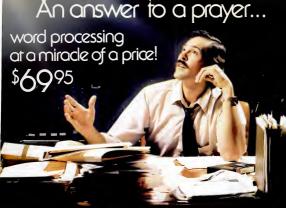
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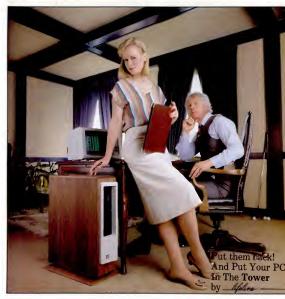
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CIRCLE 695 ON READER SERVICE CARD

In the past few months many "PC-compatible" computers have come on the market, some of them from manufacturers that seemed to appear out of nowhere. Compared to these, Eagle Computer, Inc. has a long history-this company has been around since May 1982. At that time, it introduced the Eagle II, a Z-80 microcomputer that ran CP/M. At the end of 1982. the manufacturer introduced the Eagle 1600 product line: 16-bit micros based on an 8086 chip that ran at 8-MHz. These machines bappened to be IBM PC-compatible, but their greater power and higher price tags (systems including hard disks ranged from \$4,495 to \$8,995) put them out of direct competition with the PC.

Now Eagle Computer has introduced a computer that's explicitly aimed at the



The Eagle PC, a nicely styled camputer that's compatible with the IBM PC, is supplied with Eaglewriter and Eaglecaic software.

IBM PC's market, it's called, of course, the Eagle PC. It is available in four configurations: the stripped down PC-E; the PC-1 with a monitor, one disk drive, and software; the PC-2 with an additional disk drive; and the PC-XL with a 10MB hard disk, a floppy disk drive, but no monitor or software.

The model I tested was the Eagle PC-2. To offer more appeal than mere PC-com-

patibility. Eagle bundled CP/M-88 with his machine, as well as MS-DOS. Sharp styling is a major concern in the computer's design. To achieve its dramatic looks, the Eagle contains some of the newest and best components now available. For instance, TEAC half-height drives are designed as part of the standard model, as is the latest Keytronic low-profile keyboard.

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Inside the Eagle

A quick review of the machine's specs tells a lot about it. The processor is the familiar 8088 running at 4.77 MHz. The system board comes with 128K of memory (the stripped down PC-E model only includes 64K) and has room for a total of 512K. The first 128K is soldered in: sockets are provided for the remainder. There is a socket for an 8087 coprocessor and the board comes with two serial ports in addition to the obligatory parallel port. To ensure IBM compatibility, the large-scale integrated circuits (LSi), such as the counter/timer and DMA controller, are the same chips as used in the PC.

machine that suddenly stops really any better than one that makes a few errors in vassing?

My first strong impression of the Eagle came from the quality of its construction. The enclosure is beautifully designed, of thick aluminum panels, perfectly finished. Care obviously went into the design of the case. There is a hinged cover on the right rear side that gives access to the connectors for peripheral devices. A small magnetic latch bolds it in place, but don't worry about this magnet damaging your disks. About the only way you could burt a disk would be to bold it against the magnet by catching it behind the cover.

There is also a hatch, accessible by removing five small Phillips screws, on the bottom of the machine through which you insert expansion boards. That's right: you put boards in from the bottom. The Eagle is built "upside down" compared to most other personal computers. The system board runs along the top of the case, with the integrated circuits facing down. The disk drives and power supply are mounted on the bottom of the case to form the "floor." There is nothing wrong with this approach, its just unconventional. The open base of the machine gives you storage space for the keyboard.

The designers of the Eagle must have

decided early on that the typical purchaser would not need much in the way of expansion, since there is only one slot available on the system board. The other two slots contain the floppy disk controller and the monochrome display. Since the system already has two serial ports and room for 512K of RAM, there is some justification for this design. Still, having only one more slot feels constraining.

The memory is not parity checked; given the reliability of modern memory chips, I don't view this as a particular problem. The fail-safe approach (i.e. if there's a parity error, the machine halts) taken by IBM and other manufacturers is laudable, but unnecessary. It's only a stopgap on the way to full error-correcting memory. Since these machines are not generally used in critical applications. such as life support and machine control, they can withstand an occasional mer error. Besides, is a machine that suddenly stops really any better than one that makes a few errors in passing? Without parity, the Eagle lets the user find out about memory problems in the usual ways: memory tests, program execution errors, and mangled words in your documents.

The main printed circuit board is a beauty. Premium construction techniques and materials were used throughout. All unused portions of the board are covered with copper ground plane instead of being bare fiberglass; this is a design technique I prefer. The firmware is contained in two 2764 chins (8K by 8 ROMs), with room for

two more on the board. There is no fan in the Eagle; but beat buildup does not appear to be a problem. There is no pilot light on the machine. Since it is dead quiet in operation and the monitor can be switched independently.

HE KEYBOARD is basically Selectric in layout.

it is easy to inadvertently leave the machine on.

Keyboard and Disk Drives The keyboard is yet another variant of Keytronic's Soft Touch line, it's basically

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CIRCLE 373 ON READER SERVICE CARD

Selectric in leyout, with cursor control keys, the IBM-compatible "extra" keys, and 24 function keys arranged tightly around the main keys. The typing field is e lighter color than the rest, but there are so many keys staring up at you that it's next to impossible to position your hands instinctively for touch typing.

Speaking of which, this keyboard has a noticeably shorter stroke than others. It uses Keytronic's trademark-the two-level spring. Thet is, the first half of the key's travel is opposed by a light spring and the second half by e stronger spring. The difference between the two is supposed to provide tactile feedback. This particular keyboard uses springs that are too light, especially the first set for short travel. Also, the switching or contect point is too close to the top of the stroke. The result is that the keyboard is subject to "teasing," inadvertent actuetion of a key when your finger just barely touches it. The Control key tended to hang up in its actuated state: I had to give it e good rep every now and then to free it. Following the old edage thet you can get used to anything, I continued to use the keyboard, concentrating on getting into its feel. I tried to make it become second nature, but it didn't heppen to me. There are lots of other Keytronic keyboard designs out there, some of which I love; any of them (other than the standard IBM layout) would be better than

The disk drives are TEAC half-height double-sided units. They work well and are unobtrusive, other than sounding a distinct "click" when the head-load solenoid pulls in. They are marvels of precision, jewel-like in construction. Naturally, copy-protected software that depends on the drive characteristics of the original PC won't work in this system. The Eagle's low-profile design precludes you from doubling up on floppy disk storage, since only the two half-height drives will fit. Canon's new half-height drive that holds two disks may be a solution, but chances are that the Eagle's two drives will be enough.

Troubles with Timing

There was another problem related to use of the keyboard, most likely the result of hardware and software interection. The Eagle does not appear to buffer keystrokes especially well. This is most apparent when using WordStor. Tyoing a quick

sequence of control codes occasionally would ieave the machine in a state where it only responded to some of the keys and eimost never the one you wanted. A quick

COPY- PROTECTED software that depends on the drive characteristics of the original PC won't work

in this system.

Control—OR52 to set the right margin to 52 characters would never be accepted. After pressing the Control key I had to welt until the "enter new right margin" prompt was displayed before lentered the

value.

The Eegle has two scroiling modes: normai and slow scroii. The slow scroii mode is supposed to make the screen easier to read as lines come up on the screen. Many standelone terminels do this by shifting the entire screen up, raster line by raster line. The result is e stebie image that moves up the screen smoothly. Eagle's method of scrolling is to redraw the screen from the top after having replaced the first line with the second. This is peinfully slow and not especially eesy to read; I wouldn't have recommended it. The scroll mode can be eesily changed from Siow to Fast by the ASSIGN program, but the details are buried in en obscure part of the documentation having to do with printer set up. I had to call the factory to find out how to chenge it. The people I talked to there were courteous and helpful, so I have no compiaint on that account. The documentation could have been a little more obvious in the first

place, though.

The ASSIGN progrem also permits you to set up all of the Eegle's operating parameters, including port assignments, baud reits, and printer handshaking method. Since it is menu driven, ASSIGN is easy to use—it's a nice replacement for IBM's MODE command. If you seve the newly essigned operating modes, they remein in effect until you change them sasin.



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nee account codes: 1-4 characters nee account descriptions: 0-15 characters Expense categories: 1-4 characters Expense category descriptions: 0-15 characters Evoence amounts: \$0.00 to 999,999.99

(defaults to dollar/decimal format but can be overridden) Expense comments: 0-15 characters Up to 127 user groups, each with an unlimited number of users. A coordinator system can be set up allowing one person to handle the effairs

of members within a group. CIRCLE 463 ON READER SERVICE CARD SYSTEM CAPACITIES AND LIMITATIONS Setup specification for individual users: 150 bytes Appointment and reminder descriptions: 64 bytes each (short), or 128 bytes when required (long) Expense entries: 64 bytes each (The above figures are estimates as each individual use will set up and use SHOEBOX in ways which will vary the effect upon the disk's

capacities.] HARDWARE REQUIREMENTS

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CIRCLE 435 ON READER SERVICE CARD PC MAGAZINE 346 AUGUST 1983

Eagle's Software

Englecale and Englewriter are two major programs that accompany the Eagle PC. A significant portion of the documentation is dedicated to these programs. As mentioned earlier, the machine comes with CP/M-86 in addition to MS-DOS. Curiously, Microsoft BASIC is not provided. I ran standard MS-DOS BASIC on the machine, however, and it performed as expected.

ASSIGN's menu-driven friendliness is typical of Eagle's approach to software. Eoglewriter and Eoglecalc are supplied on separate disks so that each can have its own autometically executed program that offers you the option of running the application, using some utilities, or quitting. The only thing I didn't like was the OUIT option. After displaying a message advising you to remove your disks and shut off the machine, it halts the processor so that you can't do anything else in that particular session without resetting the system from the keyboard by pressing Control-Alt-Delete. I'll grant that this may protect you from inadvertently damaging your disk files, but this degree of protection was something I could do without. I found it easier to eliminete the autoexec program and just type "EW" whenever I wanted to use Eoglewriter Englecule is an unexceptional spread-

sheet program. It is a VisiCalc and Multiplan "workalike," meaning that the functions it performs and the command mnemonics it uses are nearly identical to the ones in these well-known products. It supports windowing and consolidation and will probably be sufficient for home and light business epplications. There are no surprises in using Eoglecolc; it performs as documented.

HERE IS no such thing as directions that are too

thorough and explicit.

Englewriter is e word processor with some very edvanced features. Most notable is the Macro feature which allows Eaglewriter to do meil merges, sorts, spe-

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line just busy? This way, you'll know.) Now all these extras aren't absolutely necessary. We could have gotten by without them. But at Hayes, we're not satisfied with just "getting by." That's CIRCLE 303 ON READER SERVICE CARD

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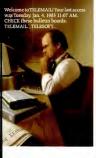
Likewise. when you're on the receiving end. Only you really don't need to be. With Smartcom II and your Smartmodem 300. your computer does it all, completely unattended That's especially helpful if you're sending work from home to the office, or vice versa.

But it's just part of the story. For instance, before you communicate with another system, you need to "set up" your computer to match the way the remote system transmits data. With Smartcom If. you do this only once, the first time. After that, the information (called parameters) is stored in a directory on the Smartcom II. Calling or answering a sys-tem listed in the directory requires just a few quick keystrokes

You can store lengthy log-on sequences the same way. Press one key, and the Smartcom II automatically exe

cutes a whole string of numbers to connect you to a utility or information service. And if you need it, there's always 'help." Even while you're on-line, the

screen will display explanations about a



prompt, message or parameter that will get you on your way in no time. Smartcom II also provides a directory of the files stored on your disk. You can create, display, list, name, re-name or erase any file right from the Smartcom II screen.



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You may have heard of Spellbinder, a

You may heve heard of Spellbinder, a consistently high-ranking word processor. Wall, Eoglewriter is Spellbinder. Eagla bought the rights to the program and offars it on all of its machines. (See "Spellbinder Comes To Th

Eoglewriter uses the "cut and peste" techniqua for moving blocks of taxt. That is, you select the baginning of the text you want to manipulate with function key F14, then move the cursor to the end of the area. When you press the function key laballed "Cut" (F12) the text diseppears from the document. If removing it was whet you had in mind, you're ell done. If you want to move that block elsewhere. you just move the cursor to the target location end press "Paste" (F13). If you cut something else out before you peste, you will lose the previously cut text. Most commercial dedicated word processors use the cut and paste method; it is easiar to learn than, say, WordStor's technique. It offers the further edventege of being eble to undelete e block of text when you make an error

The documentation for the machina itself is reesonably good. it is oriented to guiding the beginner or first-time user through the besics of turning the mechine on, inserting disks, starting programs, and the like. Missing is env mention of how to install an accessory board (e common shortcoming in manuals) or even how to open the casa in order to stuff some more RAM into the system board. Mechanical procedures such es thase may seem elementary or salf-avident, but there's elways more to it than meets the eye. Disassembling the Eagle requires removing a small squadron of screws. If you remove the wrong ones, a disk drive can wind up falling uncaremoniously onto the system board. Given the tremendous ranga of experience end ebility of the Eagle's potantial users, there is no such thing as directions that are too thorough and explicit. All manufacturers of PC-compatibles would do well to emulate IBM's manuals, as well.

To lessen the number of times you experience the pain of finding out that a PC program you just bought won't run on your Eagle, the menufecturer includes e software guide thet lists programs that have been tasted end found to be compatible with the Eagle PC. The list exceeds 200 programs et present and continues to grow.

WORDSTAR, dBase II and BASICA worked without a hitch.

I man all the usual day-in, day-out programs used in our offices et PC, including Word'Stor, dibose II. and BASICA. All worked without et hitch I elso tried Ash-ton-Tate's new Bottom Line Strongist. which worked fine, as well. This latter program is a good test of ROM compatibility to edjust itself in the hardware environment of the machine that truns the program; it dispands on information given by company to the program of the program of the product of the machine that truns the program, it dispands on information given by the product of the programs of the product of the programs and are not programs and an other programs and

There is a trick to getting the original version of 1-2-3 to work. You first must get hold of a copy of PC-DOS 1.1 and lood that instead of the MS-DOS 2.0 supplied by Eagle. 1-2-3 will than load and run. This problem is eliminated by the naw 1-2-3 version 1A. However, the default scrollings speed under anything but Eagle's implementation of MS-DOS is slow, e definite shortcoming.

To sum it up: the Eagle PC is a wellengineered machine with a strong emphasis on BIM competibility. Its design is appealing and factory support is good. Expansion is somewhell limited, but no worse than, say, the Compay's or even an original PC with IBM's acquivalent IU and abouted in the Compay's or the Compay's or who and a continual PC with IBM's acquivalent IU and should include Microsoft BASIC in the package and should replace the kayboard with one that has better leyout and more tactili feedback. Other than thet, the Eagle PC is a workmantlik product. The manifesturer can put enother feather in its capacity of the trans the computers. PC

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IBM PC: BMOC* At Carnegie-Mellon

There's nothing unique anymore about a school that plans to ast up personal computers on campus. Last atunum, Stewns Institute of Technology in Hobboten, New Jersey, began requiring that freshmen entering the science or systems planning and management programs had to buy Atari 4000 microcomputers equipped with 16K ANM. Clarkson College of Technology in Technology. New York has signed an agreement with Zenith Data 12K ANM and momenters. The file also Calabson freshman will begin to include a computer as a standard part of the cost of his education.

Then there's Drexel University in Philadelphia, the first in the country to require all entering freshmen (as of January 1984), even those in liberal arts, to buy personal computers. Drexel has contracted with Apple to supply them with 3,000 computers especially designed for them. Drexel will act as a distributor to pass along volume discounts to students, bringing the cost to each student down to \$1,000.

Great Expectations

The list of schools entering the personal computer age is gowing every day, but the most grandines plans of all is evolving at Camegie-Mellou University (CMU) in Pittsburgh. CMU and BM signed a Syver agreement last October under which IBM will help the school develop a prototype computer network that will give CMU's 5.500 tuttents direct access to the work of the computer of the

The agreement expresses the intent of IBM to continue its support another 2 years, through 1987, depending on the progress of the project. Likawise, CMU has no hard commitment beyond the 3-year agreement. "It depends on what IBM does in its product plans," says Douglas Van Houweling, vice provost for computing and planning at CMU.



Electrical engineers at Carnegie-Mellon University use personal v stations for computer-aided design of microelectronic circuits.

Van Houweling says that the decision to go with IBM in the
*Big Machine On Campus

first place was based on the popularity of its hardware and the considerable amount of software available. He also says the "compatibility path" for existing PCs to

use software developed during the project

The first order of business is for the new Information Technology Center on campus, steffed jointly by IBM and CMU personnel, to develop the prototype integrated computer environment. This includes designing, developing, and testing a work station operating system and communications support, according to lim Morris, director of the center,

The transition phase tentatively calls for the use of IBM PCs with 16-bit Motorole 68000 processors end perhaps bitmapped graphic displays. It is expected that more then e hundred of these will be available on campus this year. The system will expend to severel hundred in following years. Softwere is being developed to function in an environment based on Microsoft's XENIX, the look-elike for UNIX developed by Bell Laboratories.

The advenced phase includes introduction of the integrated computing environment by 1986, the year CMU mey begin requiring that every student in every major have a computer. "By 1987, there will be more personal computers on campus than there are telephones today," Morris predicts.

By 1991, CMU plans to heve about 7.500 personel work stations, each with its own powerful computer and graphics display, all interconnected through e highspeed local area network. In addition to communication lines between work stetions, plans call for a unified date-file system and a central computing facility to be evailable to all work stations

When completed, this network, allowing information to move in all directions, may be the lergest in the history of personel computing, according to CMU authorities. The designers expect the network to encompass faculty, steff, end students in the greater Pittsburgh area through cable television or telephone lines.

The Student View

And what will students be peving for

their system? About \$3,000 over 4 years. This may seem like a lot of money for a segment of the population that is traditionally short of funds, but what a package they'll be getting! The work stations are expected to have a 32-bit processor with virtual memory capable of executing up to one million instructions a second, a million bytes of RAM, e high-resolution graphics display, a graphics tablet, and a pointing device such as a mouse

Instead of using built-in disk storage. clusters of work stations will share a file



network of time-sharing moinframe computers to oid in the educational process.

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server through a network. The clusters will be linked to each other, as well as to the mainframe computer. Disk drives will 'be optional for stand-alona oparation. What kind? "Winchesters, of course," savs Van Houvalins.

Not all students are happy about what's happening on thair campus. About

By 1987, there will be more personal computers on campus than there are telephones today.

two dozen of them protested last October when the CMU-IBM agreement was announced at a news conference. They argue that costs at CMU are already too high. Tuition is jumping 19 percent this year to an annual undergraduate cost of \$7.500.

Others are questioning why every student should be required to join the network. They say drama and fine arts majors don't need computers as much as students in other disciplines do.

But the for and against split is not down the science/humanities line. What controversy there is centers around what input students will have in the planning procass. Students do not want to be left out of the decision making, according to Student Presidant Nathan Solano, a public policy and management major.

Students will be abla to take exams, write reports, and send messagas alectrically. Research analyses, library documents, and self-study courses will be available at the work stations. Distant data banks as vast as the U.S. Census Bureau will be only a command away. And that's only the beginning.

A Unique Plan

Three elements make the CMU plan unique. First, every student in every discipline may be required to have a parsonal computer. Second, these won't be off-the-shelf machines. Instead, thay are to be custom-designed, according to the CMU-IBM agreement. Third, these machinas will be loined in a communications network that



Researchers at Carnegie-Mellon University use computers of various sizes to analyze experimental data and control equipment.



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puses around the country vie setellite. Nice, but why is CMU heving its Personal Computers designed from scratch? Because it elreedy hes e sophisticated

time-sharing mainframe called TOPS. Students currently have far more power et their fingertips than eny off-the-shelf me-

will enable users to interact with one enother and with data banks. There are

plans to extend the network to other cam-

BM KEEPS any patents that result from the project.



An oeriol view of Cornegie-Mellon University

chine offers. The new computers will have to be designed to do at least es much es TOPS, and preferably more. And whet's IBM getting out of the deel?

Knowledge ebout college-level computer needs and epplications. Knowledge equals profits should IBM want to market its expertise somewhere else. Further, IBM's involvement in development of the prototype network end participation in testing of theories and development of new products will result in e showpiece of IBM technology, eccording to CPD News, an IBM publication. Besides, IBM keeps eny patents that result from the project.

Carnegie-Mellon University is justifiably proud of being et the forefront of innovative computer epplications. President Richard Cyert hes been quoted as seving, "This will be looked upon some dey es one of the most significent steps in higher education in the twentieth century." He cleims that the network "will have the same role in student learning that the development of the assembly line hed in the production of automobiles."



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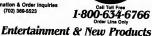
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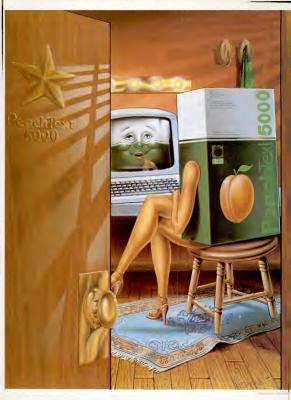
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An enterprising audio engineer teams up with the IBM PC to simplify the complicated process for mixing and mastering sound.

The PC Sounds Off

Although most computer stories are supposed to begin in Silicon Velley, or perhaps along Route 128 on the periphery of Boston, such is not elweys the case. For instence, it's heen said that one story extuelly began in Rat's Mouth, Florida. No doubt, this exotic name, which is translated from the Spanish Roco Roton, were a fector. This story, however, begins on Route 25A.

Route 25A, or Northern Bouleward as Long Island locals call it, was the host or "Audio by Zimet," a minor legend in the manules of his folkione. It was here that Long Islenders in search of audio purity would gather to buy wheteve products Sid Zimet thought were worth selling, usually at list prior. Zimet insistent usually at list prior. Zimet insistent to usually a list prior. Zimet insistent to ustome worth where the customer wanted it or not. Those didn't were invited to congregate elsewhere. Downstairs Upstairs

Zimet's product line eventually expended to include recording hardware for the basement studio operator. And since there wasn't enough of that eveilable, he

ALTHOUGH the hardware was up to the task, the engineer often was not.

and his partner, Michael Tapes, began menufecturing e line of products under the lebel "Sound Workshop." It all started in the Zimet besement and wound up in the showroom upstairs. And later, in the showrooms of other studio suppliers

ecross the country. Michael Tapes got into the audio husiness efter a year of computer science et City College made him swear never agein to go near anything so impersonal as a computer. In 1969, he dropped out of school to pursue an interest in music and electronics. While working as a service manager for a local Lafayette Radio outlet, he got involved with his own band. This led him to Hempstead's Ultrasonic Studios, first as a part-time client and later as a full-time employee. From there, a growing interest in the hardware side of recording led him out of the studio and into partnership with Zimet.

In time, their Sound Workshop line expanded sufficiently for the company to establish a separate identity, and to move into its own facilities in Hauppauge, New



Sound Workshop's Michael Tapes at wark

York. In existence for about 8 yeers, Sound Workshop Professional Audio Products, Inc. is now a menufacturer of recording consoles, and despite Tapes' early vow, computer-based automation systems for the recording studio.

systems for the recording studio. While Sound Workshop was establishing e name for itself in the professional recording industry, that industry was moving closer and closer to computers. In a recording studio postproduction session, it was not unusuel for an engineer to maintain control of some two dozen or more separate eudio signels, combining them into e well-balenced stereo program. Although the hardware was up to the task, the engineer (with only ten fingers) often was not. Cleerly, the time for eutometion-that is, for computers-had come, whether Micheel Tepes liked the idee or not.

Early Audio Automation

The need was there, and the company developed a widely-used studio eutomation system. Since its price tag pleced it above the reach of the early Sound Workshop customers, the rights were sold to MCI (the console manufecturer, not the phone company), which marketed the product es the JH-50 Automation System. It was based on the 6502, which in pre-Apple days, was considered pretty progressive.

Conceptuelly, the JH-50 stored the

movements of the console faders as the engineer balanced musical inputs. Later, the computer would reproduce this informetion, and the engineer, freed of the necessity of trying to balance all inputs simultaneously, could revise various sub groups within the total progrem.

These first eutometion systems stored their deta on one of the trecks on the same multi-track tape mechine used for recording the music. As the engineer mixed and remixed ell the music trecks, this mix-down information was encoded into a digital detestream and the expression, "Don't make the stream and the expression," Don't

worry, we'll fix it in the mix," west born.

Of course, anything thet can be fixed,
can be refixed, and then, fixed egain. And
titlese nerves of sets to ensea deta track,
while writing e new mixdown program would be
recorded on enother treet, hus preserving
the old one, "just in case." In no time at
ell, the engineer would find himself runting out of tracks, a window "improved"
mixdown programs were seved, as lacky
mixdown programs.

Soon enough, more sophisticated (read: more expensive) systems were introduced, and these were floppy-disk based. Beyond the adventege of allowing the storage of many variations on a theme, it elso became possible to merge the best

aspects of several mixes, via computer keyboard instructions. All you needed was ebout \$70,000 to get your feet wet, es long as you already had a console.

For customers who already hed an otherwise-setisfectory eutometion systems. He step-up to disk could be especially painful. It meant scrapping the entire system and starting ell over egain. In these deys of higher and higher technology, isn't it a comfort to know thet we are ell united in incompatibility?

Disk-based Storage

Sound Workshop's next step was the only obvious one: to come up with a disk-based storage system that would be suitable as a simple edd-on to the automotion systems they had alreedy built. This would ellow the benefits of disk-based autometion, while freeing the recording tape for storing just the music.

The system was ently dubbed "Disk-

mix," and It now consists of a proprietary duel-processor CPU, two 8-inch floppydisk drives, an intelligent disk controller, and the necessary power supplies.

THE JH-50 Automation System was based on the 6502, which in pre-Apple days, was considered pretty progressive.

Baically, the Diskmix memory loads up to 24 minutes of mixed own deter from disk, and then notes any changes between this memory and the current steus of the console controls. These changes are rewritten to disk, elong with dete that notes the time of which changes are rewritten to disk, elong with determined the same as is used to syne eudio and video in this and TV production, is within the memory buffer in sync with the audio tone.

A separate control computer serves as the interface between the engineer and the main computer. At first, Diskmix used e VIC-20 (remember, this was several years ago). The VIC's 4K memory soon became e major limitation, as did the many cables connecting the keyboard to the system. Next in line was the

THE BIG advantage of INKEY\$ is its ability to ignore almost all unacceptable inputs.

NEC PC-8001 A, which had a better keyboard and 32K memory. The Apple was never considered, since Diskmix needed a small, easily moved keyboard that could be conveniently placed neer the operator, yet would not obstruct the actual console operation.

While working on the Diskmix manual Micheel Tapes purchesed an IBM PC and WordStar and became an almost-overnight convert. The keyboard was an asset. There was only one cable. The PC hed good serial communication capability. IBM was a prestige name.

name.

The basic control computer soon
became a PC with 64K, an RS-232 port, the only acceptable entries are the Escape

and a color-graphics card whose composite video output drives a black-andwhite Amdek monitor. [Actual color graphics mey be added leter on.] A custom ROM is instelled in the extra ROM slot. To boot the system, a couple of simple commands access the ROM, and a screen displey instructs "Ioad Diskmix into the IBM" (via the RS-232 port].

Although Michael Tapes shows every sign of turning into a certified hacker, he has not changed his eversion to the impersonal aspects of computing. He likes his programs to be user-friendly, and toward this end regards INPUT with the same suspicion that others reserve for GOTO.

An Answer to Unfriendly INPUTS.
To shun unfriendly INPUTS, every
Diskmix routine is hendled with an
INKEYS statement. In fact, the system is
almost always in an INKEYS loop, Even in
conventional programming, tapes like to
treat numeric value raisbes as strings, using an
INKEYS loop. The finished string can be
converted to a numeric value using the

VAL statement.

The big edvantege of INKEY\$ is its ability to ignore almost all unaccepteble
inputs. For example, consider an INPUT
...oops, an INKEY\$ command, in which

key, the Tab key, and the numerals 2, 4 and 7. To begin, simply define a string variable containing these five keys. Using the ASCII value for Esc and Tab [22 and 9], this becomes 25 – CHR5[27] - CHR5[9] - CHR5[9] - CHR7[9] -



In the Edit Active mix mode, the screen displays the status of vorious consale faders on the recording console. As indicated in the upper left-hand box, foders 28-31 are about to be assigned. Faders 6, 9-11, 17-18 and 24 have been previously ossigned.

instruction will send the program wherever you like, depending on which key was depressed. Note that the statement depressed is the statement of the statement of the statement is sent in the statement INKEYS finds the null string (that is, to key is depressed). Therefore, it is, to key is depressed). Therefore, it is, to key is depressed. This will keep ropeating until a key is pressed. This will keep repeating until a key is pressed. This will keep to the statement in the statement in the statement in the K GOTO line. One say key is depressed, if it is not Esc. Teb. 2, 4 or 7, then K = 0, the key is ignored, and the program goes back to the INKEYS statement. A routine turn can accomplish ell this is given in

All this takes more programming than a simple Input statement, but it cuts down greatly on operator error later on. And when the computer is being used as a production tool for a session that may be costing the client about \$200 an hour, it's not a good idee to have errors, especially if you



In the typical postproduction studio, the recording engineer hos more than enough knobs and switches to ploy with. The PC keyboard is a reasonably friendly intruder, and con be quickly moved obout os required.



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CIRCLE 126 ON READER SERVICE CARD hope the client will come back.

To help keep errors few and far between, the Diskmix program is fully menu-driven, and most on-session work is simply a matter of responding to various Yes/No options. Using INKEY\$, the Diskmix program has been written to allow the engineer to toggle back and forth quickly between Yes and No. using the space har or Delete key. The large plus (+) key has been programmed to perform the Enter function, making Diskmix a mostly twofinger exercise. With one finger on Del and another on +, the engineer can devote minimal attention to coping with the hardware and pay more attention to the music.

From time to time—usually at the beginning of a mixdown session—a series of instructions may need to be entered using once or more of the PC function keys. Whenever this is required, the screen displays the function keys and their normal default values, as shown in Figure 2. When any function key is toggled to a non-standard condition, that key is displayed in the flashing mode to alert the operator to the change.



Figure 2: On the left side of the Mix Mera, the assignment of the PC function keys is disployed. (F2-F4 are not yet assigned.) Any key in on annstandard candiguration will be disployed in a floathing mode. On including the disployed in a floathing mode to the disployed in a floathing mode with the disployed in a floathing mode. On the disployed in the disployed

```
10 Ct.S
20 Z$ = CHR$(27) + CHR$(9) + "247"
30 K$ = INKEYS: IF K$ = "" THEN 30
40
     K = INSTR (Z$.K$)
50 ON K GOTO 100, 200, 300, 400, 500
60 BEEP: GOTO 30 'whenever K = 0
100 PRINT "You pressed ESC key.": END
200 PRINT "You pressed TAB key.": END
300 PRINT "You pressed 2.": END
400 PRINT "You pressed 4.": END
500 PRINT "You pressed 7.": END
10 CLS
20
      ZS = CHR$(27) + CHR$(9) + "247"
30
      K$ = INKEYS: IF K$ = "" THEN 30
       K = INSTR (2$, K$): IF K = 0 THEN 30
40
50 ON K GOSUB 100, 200, 300, 400, 500
60 GOTO 30
100 PRINT "You pressed ESC Key.": RETURN
200 PRINT "You pressed TAB Key.": RETURN
300 PRINT "You pressed 2.": RETURN
400 PRINT "You pressed 4.": RETURN
500 PRINT "You pressed 7.": RETURN
```

Figure 1: The short program segment illustrates the use of INKEYS in place of the customery INPLTI solutement. The first version provides a beep, warning that on unacceptable key has been depressed. In the alternate version, CSCSIB has been used in place of COTO. In either case, the last five lines (100-500) would be rewritten to provide the appropriate instructions.

Software Development

In developing the latest Diskmix software. Tapes is quick to credit other software authors for their assistance. For example, recent program enhancements have included the partiel screen-clear program that appeared in PC Tutor (PC, Volume 1 Number 10) Diskmix now also uses a modified fast-print routine, based on the one described in IBM User Update UU-12 (February, 1983). Store-bought favorites include the Norton Utilities, ProKey, and Tall Tree's electronic disk utilities.

From the beginning of the PC connection, editing has been done with the PC BASIC editor and with DOS EDLIN, which Tapes feels is the fastest game in town for meking gulck search-and-replace edits. To make the BASiC editor even more powerful, Tapes has nothing but praise for Ken Snapp's Softool BASiC Development System. This allows search-and-replace in the BASiC editing mode, dynamic cross-referencing of line numbers, location of variables and keywords, and movement of program blocks with renumbering capability. It also has a mode that permits step-

ping through the program line-by-line. With the iBM PC now en integral part of the complete Diskmix system. Sound Workshop is putting its own in-house PCs to other tasks as well. With an 8087 co-



The DISKMIX system's duoi-processor CPU with two 8-inch floppy-disk drives.

processor, and interfaced with a Houston Instruments plotter and AutoCAD software from Autodesk, a PC is now used for computer-aided design work, including the production of schematic diegrams, panel layouts, and other artwork. Super-Colc is being used for business projections, and once Tapes finishes his own

emulation program, the company's Wang business system may be phased out to allow the use of PCs as individual work stetions. Despite his persistent reservation, Michael Tapes and Sound Workshop Professional Audio Products have made sound progress by connecting with the /PC

Products Mentioned in this Article

Diskmix

Sound Workshop Professional Audio Products, Inc. 1324 Motor Parkway

Hauppauge, NY 11788 (516) 582-6210 List Price: \$19,900

CIRCLE 691 ON READER SERVICE CARD

AutoCAD

Autodesk, Inc. 16 St. Jude Rd.

Mill Valley, CA 94941 (415) 381-1819

List Price: \$1,000 CIRCLE 492 ON READER SERVICE CARD

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Softool Systems 8972 East Hampden Ave., #179 Denver, CO 80231

(303) 793-0145

List Price: \$79

Norton Utilities

Santa Monica, CA 90403 (213) 399-3948

ProKey RoseSoft

Seattle, WA 98105 (800) 227-3800

(206) 832-3603 List Price: \$75

CIRCLE 649 DN READER SERVICE CARD

SuperColc Sorcim Corporation

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Our first-time user may not know much about computers, but once he discovers word processing he certainly knows what he likes.

The Computer Virgin Gets The Word

Well ... (as our President might begin) that I was at home with four impressive boxes emblazoned with the classic IBM good, by afforts to buy an IBM PC ladn't been easy, but now that I had it, took my sweet time unleading the car, hoping thet one of my neighbors in the apartment building would wander into the hall and be suitably impressed with my new possion. On second thought, when I consider when the people in my building area (case to \$5.000 worth of assily-moved equipment now lies behind my thin, wooden door.

I heve bean told that the editors of PC, after reading my story about how I shopped for a computer, startad referring to me as "the computer virgin." I now can tell you that when I opened the boxes in my apartment, I no longer falt like a virgin ... If you get my drift.

It wasn't that I couldn't figure out how

to hook up the stuff. Actually, that part was easy, since I'va spent years fooling around with my telavision, video recorder, cabla lina, outsida antenna, and stereo

T'S JUST
as well they don't know
that \$5,000 worth of
eauiyment now lies

behind my thin, wooden
door.

amplifier. Believe ma, aftar such axpariences, hooking up the PC was a snap. Only, I think that the loose, round piece of metal on the printer plug was supposed to be grounded someplace. But, what's the difference? I mean, the printer works fine with it just hanging around doing nothing.

Passing the Book

I guess by now it should be evident that I'm not the sort of person who writers of technical manuals gear thair afforts toward. My attitude has always been that life should be a challenge—and reading how to set up complicated equipment would certainly make it less of a challenge.

Of course, I say this now knowing full wall that it would be even more of a challange for me to read the manuals. Not that thay are poorly written or unintelligible. As a former teacher of high school creative writing. I'm used to that kind of material and have sood luck at decionerine it.

No, the problem is rather personel. A couple of my best friends are employed by IBM to write technical manuals. It bothers

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t mean, have you looked at the Saranwrapped coocoction called BASIC? It

starts oul with a rather thorough disclaimer: "In order to use this manuat, you should have some knowledge of general programming coocepts: we are not trying to teach you how to program in this manual."

Fair enough, t mean they truly succeed in not teaching how to program. But it is

would have been oice if their little book suggested just where to get some of those general programming concepts. Doo't they realize people like me will opeo the boxes with great expectations and absulted you idea of what to do?

And EM had better not have meant to start teaching me with the manual that came with PC-DOS. All I wish to say is that after about 2 hours of reading it I wondered why I hadn't used my \$5.000 to hire a professional typist for the next decade. Then I discovered EDLIN and was delighted to have a chance to write something of my own choosing on the screen

Maybe I'm a bad student—all right, I know I am. And maybe I should have had the petience to follow instructions and cootinue doing things that neither made sense to me nor accomplished what the manual said they would in the first nlace.

But, good lord! I've read Joyce's Ulysses and Ezra Pound's Contos. Even though I didn't understacd them, I was at least able to eojoy them. Shouldn't I expect as much from something that had beeo billed as "user-friendly"?

Getting the Word

I want you to remember my initial feelings, for I am about to enter the part of this story that has a happy (or at least glad) endings. For, despite the frustration I felt during the first few hours my PC and I is spent alone together. I ended up falling in like (if not in love) with it. If we spend much more time together, I may actually develop a serious relationship with my PC.

This change of heart came when I reached apoint a which I fell twould for ever be a fool at the keyboard. As a last, desperate measure. I opened the Enzy-Writer II package, turned to page 1-3 of the manual, and offered a small practice of thanks to the god of silicon when I read the first paragraph. "Because It is recognite that your system may be used by persons being in the parameters of the parameters

Now I'm no babe in the woods. I had learned from my purchasing experience that people in the computer field tend to think terms invented just a few months ago areo't really technical. As a result, i wasn't completely confident that I wasn't confidence in the confidence in



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being told the truth. However, it was nice just to see that someone out there would at least say be cared.

The first staps in tha instructions were easy; they seemed to make enough sanse, so I was willing to follow them. All I had to do was put various disks into the two drives and push the keys the way I was instructed. In the end, I must have done something I wasn't supposed to do, because lended up using three more blank disks than the manual said I would have to. I still haven't figured out which ones were extra, but since I'm writing this article on the ones I made, I'm not about to stop and fix something that's working.

The true beauty of Easy Writer II's manual was in the "Salf-Teaching Document." I fully realize it was written in basic, nononsense English, geared to the average

I ENDED
up falling in like (if not in love).

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fifth grader. However, when I turned to it after my experiences with the PC-DOS and BASIC manuals. I was delighted. The difference was a little like conversing with a reporter from the Notionol Enquiere rather than Alex and his droogs in A Clockwork. Orange. Neither is necessarily the ideal, but at least you can follow what the first one is sayin.

At any rate, I dutifully sat down and began the hour-and-a-half tutorial, patiantly obeying every command, faithfully pushing every F7 and F10 key it told me to. Evan though I took frequent breaks to check on the progress of a Seventy-Sixers playoff game, I still felt that I was making some real morenes.

By the time I could insert and delete, underline and boldace, and avan change margins, I was one cocky computer operator. Of course, I know this sounds like "pride cometh before a fall" stuff, but for some reason the fall never happened.

After making a firm mental note that page 29 had a list of everything I might have to look up, I boldly created a new file, named it "Poem," and typad in my latast poem. It worked.

Sad to say, the poem didn't read quits as well on a computer screen as it did in my imagination. This fact didn't do much for my ego, but I was so delighted to have the damned machine do what I wanted that I was evan willing to concede to its gairing, unspoken criticism that the first thing I wrote with it wasn't very good. (This disappointing poem also gave me my first chanca to learn how to delate a file.)

Come Watch Me Work

Next cama some serious stuff. Real writing—the sort of thing I had to daliver to a printer by the next day for a publica-

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tion of the company that pays my weekly checks. Page after page came pouring out, interrupted only by my frequent forays to find someone to look at how well I was doing. Now, I'm a large man and have naver been called "kittenish," but that day I did act a little lika a cat that had just mastered the intricacies of a ball of yarn. I was

even pleased when my friends found errors in my text.

"Misspallad a word," you say? Watch this! And with a click of the cursor and a tap on the delete key, magic would happen right before their eyes.

Actually, not one of my friends was all that impressed. But since this was my first

experience with the PC, I figured I had a right to strut a little. "That's nice" was about the strongest comment I heard, but that friend was talking about the PC, not my writing. What they all failed to appre-



ciate was not the wonder of word processing, but the wonder of me doing word processing.

I did not think it was vary funny when several friends told me that the printer sounded like I was grinding a set of duplicate keys. I suppose they're just jealous.

Or ignorant—like me 2 weeks ago.

Not that I'm that smart now, mind you.

I mean, I still haven't got the fogglest idea

tow to use BASIC or what most of the PCDOS manual was talking about. My

institucts tall me that this machine has a

ghost in it that is capable of doing a lot

more than printing my poems and articles.

Someday zoon I will take the time to find

out how.

Frankly, I fael as if I'va entered a brave new world (in Shakaspaare's sensa, not Huxley's); I know I've only begun to see the possibilities of this remarkable machine. The novelty of it all has captivated me, so I've spent far more time writing than I usually do at my old typewriter.

However, I can see tha day coming soon when the PC will become a tool. I'll sart to save lots of time that I now lose in the drudgery of retyping, editing, and proofreading. And then the PC will free me from writing to do tha truly important things in my life.

For example, you may not have noticed my name, but it's Kannady. And that's Irish. While writing may be my work, I navar forget the great statament of Oscar Wilde: "Work is the curse of the drinking

Yes, I'm looking forward to a long and happy relationship with my new friend. Here's to it! /PC



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SIGHT AND SOUND/WINN I. ROSCH

Capturing your favorite computer graphics on film is trickier than you might expect but nothing the right "video camera" can't handle.

Screen Gems: From Monitor To Film

Haw you war wanted to peel a particulaly informative or speckcularly beautiful color image of your IBM PC monitor screen to display it to the board of directors, send it to a publishar, or donate it to the local museum of art? Without aven tying, you probably figured that you graphic restains were doomed to be forever sealed behind the front glass panel of your monitor's picture tubs.

The desire to save your images is understandable. Certainly the color graphics on your IBM PC monitor screen are a vivid, concise, and clear way of putting your ideas across, but in than-salvas on-screen graphics are axplination rether than communication. Gathering the menagament committee around your PC for e graphic displey detracts from the input of the assesses Sending your vid-

eo imaga ecross the continent is troublasoma; your colorful graphs mey nead to be accompanied by your whole software package—and maybe avan your PC and you to run it. Squashing your monitor through a printing press to add pictures to your published text is hardly a workable procedure.

Another reason to peel your images off the monitor screen is the fragile and transitory nature of their electronic axistance. Your work may require that you preserve your visual results for posterity, yet an erring keystroka, a brief power interruption, or the need to get on to other business may whisk your images into oblivion.

No doubt you can put your on-screen imaga on papar with e graphics-capable printer, but insubstantial dot-matrix may compromise the intended effect (to impress armsome) of your visual screening.

And the skinny lines drawn by most plotters hardly do justice to the bold strokes and colors on your monitor screen.

Take heart! There is e way to preserve every color, every line, and avary pixel of your on-screen graphics—and it's as easy as pressing a shutter release. That's right—just take a picture of the image on your PC's monitor screen.

Although video enthusiats have been predicting the denies of photographer is still the best way of capturing the gas deal of every image and putting to on parament display. A coler slids taken from the PC graphic display of a business chart and emonstrate as message to the bigst most important sales meeting. The same cool transparency can be dropped out of the prediction of the production of the pro

Tibet. If you really went to be drametic you can even order e full color print in eny size.

To make your off-the-screen photograpby as quick and easy as possible, several manufacturers have developed specialized cameres, each with the sole purpose of capturing color video images on film. Although every model goes by a different name--"color graphic recorder." "video film recorder." "computer graphics camra," or "VideoPrinter," just to name e few-each works in much the same way and makes similar claims. Each will produce beautiful photographs when connected to the output of your IBM PC. Each one is a complete imaging system that connects electronically to your computer: instead of pointing a lens, you plug in wires. These "screen cameras" (as we'll call them to avoid favoring eny one manufacturer) have their own built-in monitors to photograph from, so there's no need to focus and little worry about apertures and shutter speeds.

All of the cameras hendle 35 millimeter film, bleck-and-white or color, for slides or prints. Some (the more expensive ones) also work with large film formats and regular Polaroid end SX-70 instentfilm packs.

Every silver lining has its cloud, however, and with these screen cameras, it is their price: The cheapest one costs \$2,495. From there, the prices fly off into the stratosphere: \$10,000 and up.

Though at these prices you are not likely to buy a screen camera for your PC at home, if you regularly prepare graphic

THERE IS
a way to preserve every
color, every line, and
every pixel of your onscreen graphics.

presentations (like eudio/visuel slide shows) at work or if you need to preserve computer displays in your research or for publication, one of these screen cameras could quickly pay for itself in time and production costs saved.

The Curse of the CRT

The high price of most screen cameras is enough to send you rummaging through your ettic for thet old camera you heven't used in years. But there's a surprise in store if you think snapping a copy of the Technicolor imege on your iBM PC monitor screen is a simple chore. Dig out your old Instamatic, point it at the screen, end click the shutter. Instead of sparkling slides you'll probably get a box full of oddcolored, strangely-shaped snippets of what you saw through the viewfinderhardly the breethteking graphic beauty you expected. What could heve heppened between the screen end your finel emulsion? It's simply that you end your camera heve a different wey of looking et the world in general, and video screens in particular. This is where video cameres justify their high prices. They do an expert job of resolving the difference in perspective between the human end the camera eve.

When you try to use an ordinary came to photograph a CRT (cathode ray tube or picture tube), results are guiernteed to picture tube), results are guiernteed to be bud. Bright one-screen colors are destined to appear weshed out on film, seven with glaren of the glass of the screen, and tinged with blue. More likely than not, part of the screen image will be missing from the film, and what is on the meulision will be distorted. For e different view, see "Photo Repley: Making Sildes From Your PC" in this issue.]

The problems are various. From seeing examples of stop-ection photographs, you probably know that the camera is faster than the eye, oble to frezer motion with the fast snep of its shutter. That's wonderful if you went for freeze the splashing of a woterfall or the trotting of e horse, but disastrous when it comes to video. All video monitors work on e principle similar to magic—halt the buman eye registers images slowly end can be fooded if things are done quickly enough. Cameras, how-

ever, are not so guillible.

Like any television picture, the on-screen image from ePC is not drawn all st on carea image from ePC is not drawn all st once. Rather, it is built from scan lines trace ecross the screen over a period off i) on the grephics board you use). Portions of the screen image can be missed by a mismatch between the shutter speed of the camere and this scan rate. If the camere and this scan rate I the catter shutter speed is faster than the displays after the part of the picture will display after

the shutter closes, end the complete imege won't be picked up by the film.

Slowing the shutter speed can create as big a problem as it solves. Should you use a shutter speed slower then about 1/30th of e second with lenses of normal focal length or longer, you're almost certain to move or liggle the camera during expo-

THE HUMAN eye registers images slowly and can be fooled.

sure. Even slight camere movement cen blur photogrephs or cause distortion of the shapes of the images recorded on film.

Of course, you can solve the camers movement problem by locking your camers in place on a tripod. But then you must contend with additional problems, such as glare from the acreen, which can 'wash out 'important parts of the picture of low-mize the problem of glere. But then you will have to contend with reflectioned with reflection of the glass of the screen itself. Avoiding all light take your photos in e dark closel can eliminate both the glere and reflection can eliminate both the glere and reflection can eliminate both in glere for the came something in the dark.

Even if you menege to snap eway in a closet, your photos are guarenteed to look blue. Most color picture tubes are designed to produce a certain standard color spectrum, which, unfortunetely, appears bluish to most films, even though to your eyes the colors look netural. (Scientifically speaking, most color picture tubes are balanced to a "color temperature" of ebout 6500° Kelvin. Most "deylight" color films are balanced for 5500° Kelvin.) You might think that this off-color problem can be conquered by simply putting e "warming" filter (a reddish piece of optical glass) in front of your camera lens, but it won't. For one thing, the green phosphor will

overstimulete the red dyes in the film. Even if you get the colors right, though, your photogrephic images will still look distorted because your monitor screen is simply not flet. For an assortment of reasons, the fronts of most picture tubes are gently rounded. This distortion becomes obvious in photographs.

Another problem that cannot easily be corrected is the limited resolution of most IBM PC color/graphics displays. The quality of the graphics produced by an IBM PC is limited by three factors: the capabilities of the software used to create the images. the graphics board instelled in the systems unit, and the monitor screen upon which the image is displayed. Although the limitations of the first two are giving way as new softwere and graphics boards for the PC are marketad, the quelity of color monitors is limited by the physical construction of all "shadow mask" color picture tubes. Foreseeeble technology is unlikely to improve on-screen color images at an affordabla cost.

In other words, photos of your PC screen are doomed to be blue, faded, distorted, end probebly perfly missing. The photos you take of a color monitor screen with a normal camera will berdly be professional quality—nothing you'd want to stake your proposel on during a markating presentation.

The Blessing of the Filter Wheel Screen cameras solve ell of these problems in a clever wey: by circumventing the primery limitetion factor—the color picture tube. Insteed they create a color image from a high quality hlack-and-white between the screen and the film to add color to the image during exposure. Three color filters corresponding to the primary

SCREEN
cameras create a color
image from a high
quality black-and-white
monitor screen

colors of light—red, blue and green—are shifted sequantially in front of the camera lens. Under control of a microcomputer built into the camera, the exposure is divided into three segments: one through the red filter during which the red portion of the screen image is displeyed on the monitor screen; one through the green filter while the green part of the image is displeyed, and one through the blue filter when the blue part of the image is displayed. Because e single frame or sheet of film is used for all three exposures, the filtered hiack-and-white exposures add up to e single full-color image.

Any color mismatch problems are solved by simply varying the exposure time devoted to each of the three primary colors. If the picture looks too hlue, the exposure time of the film to the blue filter/blue image combination is shortenad.

The resolution problem inherent in

The resolution problem inherent in photographing an ordinary color monitor is solved automatically because black. In an and white picture tubes do not have and own masks. They have virtually no physical limitation to the quality of the cameras we investigated used monitors with 100 picture of the cameras we investigated used monitors with 100 picture of the cameras we investigated used monitors with 100 picture of the cameras we investigated used monitors with 100 picture of the 100

Image distortion caused hy curved screens is eliminated by using special (and expensive), flat-feced cethode ray tubes or by using only e small, central portion of a regular tube.

Part of each screen camera is a fixedfocus lens (no focusing edjustment ever need be made) which is held in place pointing at the monitor screen inside a virtually light-tight enclosure. Glere and weshed-out color are pravented by the enclosure. Within this self-contained derkroom, exposure time cen be lengthened so that all the image is certein to be displeyed. In fact, meny screen cameras synchronize the opening and closing of their shutters to correspond axactly to at least one full scan of the monitor screen. Long exposures, in the range of a few seconds, also ellow for sharper pictures because the hrighter the phosphor dots of a CRT screen, the biggar thay become. A dimmer image (requiring iongar exposure) can therefore be made sharper.

These color-wheel systems can also add extra capabilities to your on-screen grephics.

Some screen camaras can changa black-and-white grepbics into color. By breaking your graphics into different elements and exposing each element separataly through a different color filter, you can meke color slides from your monochrome software. For instance, for a har chart contrasting the reletive sele of three separate itams, you could display the chert with one set of bars (end the framework of the chart, the axes end lebels) using the red filter. Expose the next set of bars and the same framework using the green filter, and the final set of bars using

YOUR OLD Instamatic does have one advantage over the expensive screen cameras.

the blue filter. On film your three sets of bars will each he a different color, and the framework axes and captions will show up whita hecause they were exposed to all three colors.

Most (but not ell) of the screen cameras allow smoothing out the jagged adgas of on-screen grephics or filling in between the scan lines of your video images. Nearly all allow adjustment of contrast so that blacks can he bleckar and whites whiter. All allow some flexibility in "bright-

Your old Instemetic does heve one edvantage over the axpansive screen cameres, however. With a separate camere you can make a slide of only a portion of the on-screen innee, to focus on a grephic bighlight or to crop the frame to sull yoursalf or your presentation. None of the screen cameras investigated here allow this. Thay photograph the whole screen—or most of it—and sometimes this can be a problem.

As with any television screen, the aspect retio of the IBM PC monitor screen is 3:4 or .7; that is, for a vartical measurement of three units, the horizontal will measure four units. The aspect ratio of 35millimeter film is 2:3 or .667; of 4- by 5- or 8- by 10-inch film, the aspect ratio is (obviously) 4:5 or .80. It is therefore impossihla to fit an on-screen video image exactly within the frame-of a photograph. Although tastes very, it's probably better to have all the image on film and leave a little emulsion unused than to lose part of your graphic creation to the arbitrary editing of a camara. /PC



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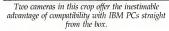




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Illustration of seven comeron reviewed in this suitel. Top (from left to right). Marinaments Saberia 1990, Dann Instruments Model 835, and languagement 1990, Top 1990



Points Of View: Comparing The Cameras

Ever your faithful servants, we decided to try out the new combination of photography and technology to see what you might expect. In our explorations, we discovered roughly half a dozen different video camera models, and like kids in a candy store, we decided that we had no alternative but to order one of everythins.

We made one requirement plain to every supplier: Whatever we received had to be PC-compatible, for obvious reasons. In a few days we had a room full of wonders—wonderful machines ranging in size from smaller than a breadbox to nearly as large as a refrigerator.

With an effort we thought typical of PC-users' capabilities, we had three of the cameras operating in a few minutes. The rest of the testing had us waiting for a color graphics adapter from Scion so that we could hook up the no-PC-compatible RS-170 inputs that the other cameras used.

Comparison of 35mm transparencies of similar subjects taken by (fram left to right) Cellic, Lang, and Image Resources comeras.































We took several rolls of film and were more than a little surprised when we received the results. We had anticipated that the differences we would find would be principally in easie of use, versatility, and PC-compatibility. Because all of the screen cameras solve the immense technical problem of putting a video image on paper in exactly the same way, we figured the images on film would be very similar. They were not. The differences lie in the realization and not in the basic premise.

Working with the Celtic

The Celtic Technology model VFR-2000 "Video Film Recorder" is the smallest and most stylish of the screen cameras we investigated. Smaller than a breadbox. it bides a built-in 35-millimeter camera body and all its controls behind a door on the front of its off-white heavy plastic case. This plastic shell provides most of the support for the camera's internal electronic and optical mechanisms. Removed from its case, the unit has unpromising structural integrity—the chassis flexes and bends, hardly instilling confidencenot that it isn't strong enough to hold together, it's just doubtful that it will maintain perfect optical alignment.

Several consequences follow from the camera body being built into the main body of the unit. Only one film size can be used, standard 35 millimeter. In fact, only two films are recommended: Kodak Ektachrome 64 for color and ASA 125 black-

LIKE KIDS in a candy store, we decided to order one of everything.

and-white film. Nor can the image be previewed through the camer a viewfinder. There is no viewfinder. Instead, there is a peephole in the front of the unit. By pressing one of three diny buttons next to this miniature window-into-the-works, you can see, in black and white, the image made by each of the red, green, and blue sienals from the computer.

The model VFR 2000-TL135 comes equipped with a 9-pin "D" connector, fully compatible with the output of the tBM



The PC is, of course, a digital machine but with the right tinkering, you can hook it up to an analog camera.

There are two major ways for computers to deliver a clost signal to a monitor. The one most familiar to PC users is TTL, which stands for transistor-fransistor logic. It signifies the industry-stendard voltage at with one another. There are five significant signals that come from the color graphics adapter, one for each primary color and one each for horizontal and vertical synchronization. TTL signifies that the color lines are being switched on and of rapidly in them with the synchroniza-

Analog color, on the other hand, uses a high-speed analog signal (The level of the voltage is part of the information, not just whether it is present or not.) to convey the color image. As with TTL, there are three signal lines. There may be a separate line for synchronization or the sync signal may be "piggybacked" onto the green signal. "Sync on green" is a common mode of operation. There is a standard that defines this style of video interface: RS-170. The nature of the analog signals requires that each be carried from the computer to the camera in its own coaxial cable. For a variety of reasons. RS-170 is the prevailing standard in the industry. First, the "bandwidth" or ability to encode data is relatively unlimited. Second, analog techniques have been in use in the broadcast industry from the beginning, while TTL is new and untried by comparison.

Several of the cameras we collected for this test were designed for analog input: the Matrix, Modgraph, and Dunn. We also tested Lang's Videoslide 35 with its optional RS-170 interface board. We drove these cameras with Scion's PC640 Color



4- by 5-inch transparency taken by Image Resources camera.

35mm transparencies taken by Polaroid Corporation Polette camera.











35mm transparencies taken by Modgraph MFR-8 camera













35mm transparencies taken by Dunn Instruments Madel 635 camera.









35mm transparencies taken by Matrix Instruments Madel 3000 camera.

















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Graphics System and Control Systems' were never in our offices at the seme time. Artist 1 board. Both output RS-170 signals. These boards offer significantly greeter graphics capability than IBM's standard board.

Customized Cameras

The technicians at Moderaph built an RS-170 to TTL edapter for us so we could test the camera with the standard IBM color board. Unfortunately, IBM was less than helpful in providing the technical information thay required to get the sync signals straight. They built the interface anyway, and it was only partially successful. When they brought it to our offices, we gave them copies of a few pages from IBM's Tachnical Reference manual. which hed all the information they needed to build it right.

Once we set up the Scion card for sync on green operation, wa were abla to driva all the RS-170 cameras. The Videoslida 35 was the easiest to operate, having only one control. The Matrix was next to impossibla to operata, givan its complax, menudrivan setup mode. The Modgraph was close to the Videoslide 35 in simplicity. It is much easier to fine-tune the Modgraph, since the controls are accessible from the outsida, behiod a covar plate. Videoslide's adjustments are inside under the cover or on the back of the machine. The Matrix controls are all on the front panel, in the form of a myriad of pushbuttons. Modgraph's praview systam is the best of the

NALOG techniques have been in use in the broadcast industry from the beginning.

lot, since you can open a slide and swing back a front-silvered mirror to view the monitor directly. The others require that you remove the camera back or peer through the viewfinder of the 35mm back.

We naver got to test the Dunn recordar, sinca it and the enelog graphics boards Its features are impressive, as it offers everything from 35mm to 8×10 for image recording. Wa also didn't have an oppor-

LOUR COMPUTER is far and away the most limiting factor on the resolution of the images you produce.

tunity to tast Image Resources' camara in its nativa RS-170 moda.

Both the Modgraph and Matrix units ere tank-like in construction, with thick aluminum panals, heavy bases, and many screws. They have massive machined collars and registration pins to ensure proper location of the interchangeable cameras and film backs. Internally, the wiring and components are top quelity and very ruggad. Both use the Tektronix 634 flatscreen high resolution monitor. Each. however, has proprietary timing and exposure controls. The Dunn camera is no less rugged, but somehow seems lass "polished" than the others. The Lang camera is remarkable for its simplicity, while no lass effectiva for most 35mm purposes.

None of the recordars we tested had any difficulty handling the higher resolution of the analog boards, since they still don't come close to the cameras' limits of resolutioo. This is almost humbling, when you consider the quality of the images we were producing. But then, we're not IPL displaying Saturn's moons, oor are we General Motors designing e new bearing. The bottom line here is that your computer is far and away the most limiting factor on the resolution of the images you produce. Choice among the cameras comes down to the features you need or want and the price you can afford to

Among the RS-170 recorders, I prafar the Videoslide 35 for its ease of use and the Modgraph for its flexibility. The Image Resources camere proved quite flexible in its TTL mode and is likely to be much the sama with RS-170 inputs.

-Bill Mochrone

color/graphics board. The camera is connected to the computer, then the IBM color monitor is plugged into an output of the camera. According to the preliminary instruction manual we received, any numher of cameras and monitors can be linked togethar in this way. However, when we tried to "daisy-chain" several of the cameras we wished to test, the Celtic did not take to it vary well and its screen image started to roll, like the loss of "vertical hold" on a television set. Possibly, the Celtic is more sensitive to ground loops and other conditions on the signal lines than are the other cameras.

The biggest problem we had was loading the film. The preliminary manual did not tell us that a button we had to press to operate the film transport was hidden underneath the front edge of the camera. Once we solved that mystary, we had no further problems moving the film. Both winding and rewinding is automatic, and a "beep" indicates when a frame passes through in either direction.

Using the camera is simple. You make an exposure by pressing a large, green pushbutton. The camera beeps after it finishes each exposure of each of the three primary colors. This pushbutton illuminatas when the camera is ready to take a picture. Four controls, normally hidden behind the door that accesses the film transport, allow "fine tuning" of the brightness, contrast, color and "jaggedness" (how much the raster lines of the video image are smoothed) of the image.

HE BIGGEST problem we had was loading the film.

To ascertain the degree of control afforded by these adjustments, we took separate exposures with each control rotated 90 degrees. The differences were hardly perceptible. In fact, rotating the brightness control fully in aither direction only changes the exposure by one f stop-with today's films, a barely noticeable difference

The slides we took had bright, saturated colors that were true to what we saw on

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the PC monitor screen—except for ona slide, in which all the colors were washed out for no apparent reeson. On each slide the verticel imege was slightly smaller then the cardboerd slide mounting; this meens averything on the screen mede it onto the slide. (Because slides are more rectangular then video screens, the imegas

THE IMAGES suffered from noticeable geometric distortion.

made by eech cemera lis well within the horizontal bounderies of the cardboard mounting.)

The images were not perfect, bowever. They sloped of to the right. And they suifared from noticeable geometric distortion; they were slightly trapezoidal. This results in squares that aren't square and circles that aren't perfectly round. The aberrations were minor, and should be ecceptable to those not demending absolute perfection.

Lang VideoSlide 35

The Leng Systems, Inc. VideoSidide 3S "Color graphics camera" appears to be the easiest to operete of the screen cameras. At least it has the fowest controls! The front has only two switches: a rocker switch to turn the power on and a pushbutton to make on exposura. Three thumbwheel switches, located on the back panel, which allow adjustment of the exposure times through each of the three color filters, complete the available controls.

A normal-looking 33-millimete came is permenently mounted on the front of the unit, limiting the choice of film to that one formst. Looking through the came are viewfinder gives a preview of an image—but only the red image seen through the red filter. A motor winder built into the base of the unit gives the only indication that the exposure is complete. The film winds automatically; rewinding, however, is a manual opera-

Severel interfeces are eveileble for connecting the Lang to a variety of image sources; the unit we received used whet Lang calls "TTL RGB," which plugged directly into our IBM PC and color monitor in the same manner as the Celtic.

Lang recommends the Eastman Kodek Ektechrome 200 film be used, but concades thet Ektechrome 240 film be used, but concades the textchrome 54 and Kodechrome heve also been used successfully. To aliminate possible outside influence on our test results and to ensure consistency, we chose to use a single vertice of film from a single emulsion batch. Because all the other screen cameras were competible with Ektachrome 64, we standardized with that.

It was not the best choice for the Lang. With the factory's recommended settings for that film, the exposure time was unbearably long, about 50 seconds. Nor was the recommended combination of axposura timas through the different filters acceptable. All the images were obviousiv biue beceuse avery color was tinged with blue, including the black of the backgrounds. Some adjustment for this off-color result can be made with the back penel thumbwheel switches, but because the adjustments are incremental and not infinitely verieble and because no "fine tuning" controls are eveileble, colors cannot be "tweaked in" perfectly by a casual user. We elso found that the location of these controls on the back panel of the rather

long unit was inconvenient. The entire on-screen image fit tightly within the boundaries of the cardboard side mounts. The horizontal lines in the unit of the cardboard inconvenient was a single anomato of the cardboard promoters of the fine, a sight encount of score the cardboard to the cardbo

Image Resource (aka Polaroid)

The Image Resource model 5000 "VideoPrint" closely resembles the Polaroid model 4 "VideoPrinter instant color-film recorder." In fact, eccording to Lee Benadict of Image Resource Corporation, the model 5000 is "en eerlier version of the Polaroid model 4."

The model 5000 cama to us specially modified to plug directly into the IBM PC. The camera is not normelly supplied with

a competible RS-170 interface.

It is axtremaly versatile end will hendla 35-millimatar film rolls, 4- by 5-inch sheet film, and Polaroid SX-70 film packs, depending on the adapter that is ettached to it. Not only will VideoPrint centure color images of color graphics, it can also turn black-and-white graphics into color on film. Its versatility allows it to be programmed to make multiple prints as well es bendle e dizzving number of other functions. Nevertheless, using it can be as simple es pressing e button. Light emitting diodes (LEDs) and flashing lights indicate each individual color exposure end signal when the camere is finished with a shot. A multidigital numeric LED displey indicates how the multifunctions have been programmed.

With all this gadgetry, you might axpect an autowinder as a standard feeture on the Image Resource 35-millimeter film transport (wall, okay, a modified Yeshica camere). After ell, winders are standard on ell other screen cameras we tried. A winder does not come standerd with the Imege Resource, however. Severel times we were disconcerted to discover that the film had not been wound. (Perhaps our error, but we're ell in fevor of error-prevention.) Strangely, too, in the first box of slides we received back from the lab, the edges of two frames overlapped, indicating improper advancing of tha film. None of the autowinders damonstreted this problem.

We tried this cemere (it's big, heevy,

ONE SIDE had a bright border, the other a dark border.

end sturdily made) on both 35 millimater end 4 by 5 sheet film, both Kodak Ektachrome 64. Tha 4 by 5 quelity impressed us; the 35 millimeter appelled us!

Tha 4 by 5 images are almost impossible to fault. Sharp, seturated colors. Black is really black. No visible geometric dis-

The 35-millimeter images abounded with problems. The image extended beyond the limits of the frame, so the periph-



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Sorbus Service Division of Management Assistance, Inc. 50 E. Swedesford Road, Frazer, PA 19355 (215) 296-6000 ery of the monitor screen did not appear on the slides; the horizontal lines in the image were not parallel to the edge of the film (more severely tilted than on the Celt-

> SEVERAL era makers implied

camera makers implied that IBM's insistence on a separate standard was obstinate.

ick and a black curved line crawled across the bottom left corne of every slide, as if a wire were dangling looss in front of the coarse. On the positive side, however, and the colors were as bright and as attented as on the 4 by 5 fins, and no geometric distances on the 4 by 5 fins, and no geometric distances of the colors were as bright and as attented as due to the colors in the design of the VideoPrint unit but in the physical adaptation of the outside supplier 2 station on the outside supplier 2 station on the outside supplier 2 station on the outside station is that more attention to

PC Compatibility

All the screen cameras investigated when have RGB inputs, which means that they use a separate wire to connact each of the primary colors, just as with the PG-clor monitor. For the color monitor, for the primary color stapplies adapter can be allowed to transfer the highest quality color signals.

Some cameras also accept normal NTSC color signals, one-wire video like that from a videocassette recordar or the video connector (the one with one big central pin) on the PC color/graphics card. Using NTSC signals will severely degrade the color picture performance of a monitor or camera.

Although RGB connections assure high quality, in the case of the IBM PC it can also mean problems because tha IBM PC does not have an RS-170 output. RS-170 is the interconnection standard for RGB signals. In some ways this is a reason to give

thanks; RS-170 specifias three or four saparate cables with expensive connectors on each end. Using one cable, as IBM does, simplifias interconnection with the color monitor and keeps the cost of cables within reason. Although several camera makars we spoke with implied that IBM's insistance on a separate standard was

obstinata, in truth, RS-170 is an analog video standard, and the PC outputs are strictly digital [TTL] signals.

Not only are the interconnection cables different, but the PC uses nonstandard signals inside its wires, too. Its synchronizing signal, for example, is inverted compared to the video industry norm. And



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IBM adds an extra signal to indicate bright or dim on-screen images that the RS-170 standard does not provide for.

The bottom line is that by itself (as well as with most color/graphics adapters from outside vendors), the IBM PC is not com-

patible with RS-170. If a screen camera has only RS-170 inputs, there is no convenient way to plug a PC into it. Using a "composite video" or NTSC connection between those cameras and the PC will

degrade picture quality.

The manufacturers who provided cameras to be evaluated for this article were told that the hardware tests would be done using an IBM PC. As received, however, most of the screen cameras could not be plugged directly into a PC.

Screen Image Camera Features

Camera Manufacturer	Celtic Tech. 6265 Variel Ave. Woodland Hills, CA 91387 (213) 884-6787	Dunn Instruments P.O. Box 77172 544 Second St. San Francisco, CA 94107 (415) 957-1600	Image Resource 2260 Townsgate Rd. Westlake Village, CA 91361 (805) 496-3317	
For more information circle reader service card number	#690	#689	#688	
Model Number	VFR-2000-TL-135	635	Videoprint 5000	
Controls: Brightness Contrast Raster fill Color or chroma	Yes Yes Yes Yas	Yes Yes Yes Yes	Yes Yes Yas Yes	
Exposure Time 35mm, ASA 64	14 sec.	NA	15 sec.	
Film Formats 35mm only		Has built-in auxiliary port 35mm; 4×5 ir adaptable to any format Polaroid back		
Interface: Directly PC-compatible?	Yes	RS 232 interface (RG13) video output	No ²	
Proview	Peephale	Through camera	Viewfinder (35mm) or groundglass (4×5)	
Automatic wind (35mm) Automatic rewind (35mm) Color from black and white	Yas Yes Yes	Yes Na Yes	No ³ No ³ Yes	
Special features		Very user-interactive Powerful diagnostics in software Z80-based microprocessor controlled	Programmable multiple exposures; meny other programmable features	
List price	\$2,495	\$12,950 (for combination 35mm end 8×10 formets)	Approximately \$7,000	

Notes: The resolution of oll units is better than the graphics output copobility of a standard IBM-PC. All units have video frome rates and harizontal sweep rates compatible with the PC. All units have frame counters (Celtic is electronic) and operate on standard "hause current".

[&]quot;nause current."

Brightness ond color can be oltered by chonging thumbwheel control (an back of camera) for exposure of each separate calar to vary
colar mix and total exposure.

²RS-170 interface standard; unit tested modified by manufacturer to be PC-compatible.

³Matar drive far 35mm available as action; not present on unit tested.

Two of the screen cameras (Lang and Celtic) were directly compatible with the PC straight out of the box. They connected simply by plugging a cable into the color/graphics board 8-pin output (into which the monitor cable would normally go),

then plugging the monitor input cable into a connector on the camera.

The Image Resource had been previously modified by its manufacturer (at the special request of PC Mogozine) to be PCcompatible. Straight from the box, howev-

er, the Image Resource camera uses an RS-170 interface. Other video cameras with varying capabilities can be adapted to the BM PC. To learn about these, see the sideber entitled "Analog Cameras: A Breed Apart?"

Lang Systems, Inc. 1010 O'Brien Dr. Menio Park, CA 94025 (415) 328-5555	Matrix Instruments 230 Pegasus Ave. Northvaie, NJ 07647 (201) 767-1750	Modgraph 1393 Main St. Waltham, MA 02154 (617) 890-5764	Polaroid Corp. Industrial Products Division 575 Technology Sq. Cambridge, MA 02139 (617) 577-2000
#687	#686	#885	#684
VideoSlide 35	3000	MFR-8	Pelette
No ¹ No No No ¹	Yes Yes Yes (switch selectable) Yes (exposure ratios)	Yes Yes Yes Yos	Yes (programmable) No Yes Yes
50 sec.	Less than 10 sec.	15 sec.	Variable (under software control)
35mm only	35mm, 35mm tin reg., SX-70, 4×5, 8×10, 16mm	35mm, 4×5, SX-70, Kodak PR-10, 8×10	35mm, 3¼×4¼
Yes	Requires RS-170 interfece	Requires RS-170- type signal. Manufacturer provides interfece module for competibility	Yes
Viewfinder, image red filter only	Peephoie	Screen vieweble with module installed	No
Yes No No	Yes No Yes	Yes No No	Yes No Yes
	Utilizes own monitor electronics of the control of	Folded optics minimize console dimensions Can switch from PC to other RS-170 systems Unlikes Tektronix CRT	Software controlled Menu driven Other options eveilable through drivers on selected graphics software Batch processing programmeble for both menual end autometic cameras
\$2,599	\$10,000-\$12,000	\$9,000-\$11,000	\$1,300 (includes 35mm Polaroid auto process herdware for rapid access 35mm slide production)





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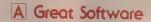




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9300 W 110th St., Suite 380 Overland Park, KS 66210 USA 913-363-3089 • Telex 209562 Do you need a dozen slides for tomorrow morning's presentation? Disaster? Not necessarily. If you have a 35mm SLR camera, a tripod, and a fairly good eye, not to worry.

Photo Replay: Making Slides With Your PC

One of my chores as e university faculty member is the preparation of talks and lectures, sometimes with only a brial anotica. It is unusual today to give atalk, lecture, oscientific presentation without the support of 35mm sildes: a carousel projector is always available to a speaker as a metter of course. Sildes not only present information, but elso as serva as a causing droit, freeling the speaker from having to use notes or read from a manuscript.

Recently I had to present an hous-long that that had been incorrectly scheduled for "next" month and which, at the last minute turned out to be for "this" month. I had to have some slides—e lot of them-in a hurry. There want I time to go to our photography department to have them made. You've seen the cartoon thet shows the little man doubled up in a paroxys mod longither. In a 'saying, "you need them the property of the prope

Jusually compose my slides on the PC screen with WordStor, then print them out as letter quality copy, to be copied and mada into finished 35mm slides by our phetegraphy department, a process that takes a week or more. This time, because

of the foul-up in scheduling, I decided to try to copy the slides directly from the monitor onto Ektachrome film, which can

be processed locally in about 3 hours.

I soon found that slidas—and reasonebly good ones, et that—can be meda

L'VE FOUND that it is easier to move the display than it is to move the camera.

using the PC. The result is certainly not as good as sides made eithar by purely photographic techniques or by dedicated computer-generated slide copiers (megabucks). The slides are quite acceptable for most purposes, however, and they are certainly quick and easy to make. Many emateur photographers have all the equipment needed.

ment needed.

Hare than are some hints on making in xpensive computer-generated slides, some notes on equipment, on calculating

proper exposure, and obsarvations on different types of film.

Equipment and Alignment

A 35mm single-lens reflax camere with manual controls, a good study tripod, and a cable release are necessary. Exposures are long: they must leavage be more they less of second or the sweep of the alectron beam across the cathode ray tube will show up on the slide. The camera should be placed on e tripod and fixed securely ly kicked the entire setup does not have to be repositioned.

The camera elso has to be checked visually to be certain that it is level. A ground glass or tissus paper can be used at the local plane with the back open and the het hosel plane with the back open and the lastraight, eithough this is the hard ways to check eligmant. This is important because, strangely, the view as seen through a SLK viewfinder may be alightly canted from the way that the image is actually projected outs the film. Although this projected outs the film. Although this ference in projection, the slide containts may jook noticeably slanted.

The "normal" 50mm lens that came

with the camera is not adequate: It just doesn't focus close enough, so some type of accessory lans is required. This may take the form of a screw-on close-up lans attachment for the 50mm lens (although this places the camara awkwardly close to the screen), a macro lens (the longer the bettar-soma zoom lenses with macro capability will work well, also), or a teleconverter to convert the standard lens to a 100mm lens with close-up ability. An even better choica, if available, is to use a longer than normal lens (I use a 135mm) plus the taleconverter. This permits me to place the camera behind my chair so that I can sit down to adjust the display. I've found that it is easier to move the display than it is to move the camera. A bit of exparimentation will show you just what your close-up capabilities are, given the equipment available to you.

Film

Almost any type of film is suitable. I prefer Kodachroma 64, as I use it for all my medical photography (plastic surgeons take pictures of almost every patient), but Ektachroma is certainly just as good and,

as noted, it can be processed quickly if time is important. In the very near future. "instant" 35mm slida film is due to be released by Polaroid in both color and

PORTUNATELY, since only two valuesone relatively bright, the other black—are being registered on the film, there is a fairly wide latitude for exposure settings.

high-contrast black and white. If thesa films live up to expectations, they will offer the ultimate capability for making slides on brief notice-just a few minutes

before a presentation, if necessary, If you use color slide film you will find slides directly from a monitor is in the

that the green on black of the IBM monitor projects very well. Color may be shifted toward blue by using a film such as Ektachrome 160 Tungsten, which has a built-in blue bias. You may find the blue a bit more peaceful than the monitor's unrelieved Kelly green, which is faithfully reproduced on daylight film. The really adventurous may want to try color negativa film, such as one of the Kodacolors, where the color is reversed.

Readers with darkrooms may also want to try bigh-contrast black and white film. The negative, used directly as the finished slide, will have black characters on a clear background. This combination may seem rather unimaginative, given the extent to which many slides today have been gussied up with vivid color and graphic effects, yet there are those who believe that oll slides should be projected with black print on a white background for maximum clarity and minimum distraction.

Exposure

The biggest initial problem in copying

Projecting A Good Image

This short PC photographic primer was reproduced from slides provided by the author.



determination of an acceptable exposure. Fortunetely, since only two values—one relatively bright, the other black—are being registered on the film, there is actually e fairly wide latitude for exposure set-

tings.

The simplest method of determining proper exposure is to use trial and error

I ALSO suggest that a minimum setting of ff4 be used, even though your lens will permit larger openings than this.

and brecket a number of test exposures to determine which one is most satisfactory for your own equipment. This works just fine, but be sure to record all settings both on the camere and on the monitor (a tiny sliver of colored upo on both the bright-ness and contrast knobs end matching ones on the body of the monitor will ellow future reproductibility). Monitor brightness should be adjusted to the point where here is good resolution of the characters with minimum haloing about them. To have the companion of the characters with minimum haloing about them. To have the companion of the characters with minimum haloing about them. To both a setting makes for poorly deep end. "blobby" characters with color-contaminated backwounds.

The methods that I use to determine sepourus may also work for you and has the advantage of being completely reproducible without the need for bracketing. This involves reversing the screen. [See the program submitted by Christian du Lac "User to User," PC, Volume 1 Number 9, Some utility programs du how the bit. I use the screen reversed program to the whole the screen reversed program to my WordSher disk to that I can call it up any time I want to take an exposure reading.

Using a hand-held exposure meter (the one in the camera will do, but may be herd to reed), the screen is then set to a known value. I use an exposure value of 5 or 6 for

the reversed screen reading. This reading, taken from the bright screen, will be ebout 3 stops too bright, so the lens should be opened this much beyond the value indi-

A WORD
processing program is
not absolutely
necessary, but it does
make slide composition
easier.

cated. For example, a typical reading on the reversed screen might indicate an exposure value of 6, which translates to 14 et 1/s second; opening 3 stops will give 1/4 et 1 second (the slowest time on many cameras; beyond this may require the B setting, counting off seconds of exposure). This setting, incidentally, is probably as good a starting place as any for a fairly dim



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screen if you are going to use the trial and error, guess and brackat mathod. It will probably give reasonable results even with moderately slower or faster film.

If exposures are made with an automatic camera, there may be a lot of discrepancies in brightness from slide to slide. dapending on how many characters are on screan to affect the mataring, so the manual mode should always be used. I also suggest that a minimum setting of f/4 he used, even though your lens will parmit larger openings than this. Dapth of field is very small in close-up photography, and edges may be out of focus at faster set-

Composition

You may find that it helps to have the room lights on in centaring the slide in tha camera viewfinder, the light will make it easiar to see the edges of the viewfinder frame. The actual exposure should be made in a darkened room to avoid reflected highlights on the screen. These may not be obvious during composition, but will show up later on the slide.

A word processing program is not absolutaly necessary, but it does make slide composition easier. WordStar has

HAVEN'T figured out how to get rid of the flags and the cursor, but they're not all that much in the way.

advantagas and disadvantages in preparing on-screen slides for reproduction. For example, it is possible to topple almost all the axtraneous material-including the Help menu and the rular line-off tha screen, i haven't figured out how to get rid of the flags and the cursor, but thay're not all that much in the way (just don't forgat to hit Home to push the cursor up and out of the way before making the exposure). On the other hand, WordStor won't allow screen-visible underlining and boldface and these are nice to have in composing slides.

Last Words

I recently had the opportunity to work with the soon to be released Bruce and lames WordVision program. This program gives axcellent flaxibility, with both onscreen underlining and boldface capability, but the ruler line and manu intruda if the slide covars much of the screen. This would be an excallent program to use for slida composition if these program aids could be toggled out.

A bit of experimentation will allow you to photograph whatever is on your screen. If you're into color graphics your imagination is the limit. Slides are easy to make and can be used for many purposes: to enhance home slide shows or for business or scientific presentations.



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Two asynchronous serial channels are provided which are completely compatible with IBM serial channels. Each channel can be selected to reside at one of four addresses to allow for future expansion. A unique feature is provided which allows simple selection of data provided which allows simple selection of data (IBTE/IDCE control communication equipment in the control of the control of the control of IBM (IDCE) and the control of the control of provided which allows on the control of IBM (IDCE) and IBM (IDCE) and IBM (IDCE) the control of IBM (IDCE) IBM (IDCE)

The Real-Time Clock section features quartz-crystal control and lithium battery backup to ensure years of trouble-free operation. The RTC features hours, minutes, seconds. day-of-the-week, date, month, and year with automatic leap year adjustment. Software is provided to initialize system time and date information automatically upon power-up. p-Disk*, a disk-emulation package

provided with the PDI464 allows memory to be treated as an ultra-fast disk oftwe, PDI64° can be configured as a single or double-sided drive and can appear as drive B, C, or D, PDI64° does not require modification or patching of the BIOS or DOS files on system diskettes and is fully compatible with IBM software and diannostics.

A background printer spooler is included with the PDI464 which allows files to be printed on a printer while other software is being used in the foreground. The spooler offers features such as menu-selectable configuration, multiple copies, and unper

case options.

Comprehensive documentation is provided with numerous illustrations to simplify installation procedures. All documentation fits neatly into existing 3-ring binders provided with the Personal Computer.

Each PDI464 is "bumt-in" at elevated terminatures and fully tested. Packaging material provides protection from static and mechanical shock during shipment to further ensure reliability. The PDI464 is covered by a one year limited warranty.

p-Disk* is a trademark of Pure Data Ltd.

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The PDI 256 provides up to 256KB of user memory with parity on a single expansion board for the IBM Personal Computer. Memory is organized as 4-64KB memory banks, each bank can be set to any 64K boundary within the 1 MB address space. Individual memory banks may also be deselected. All address mappings are made by DIP switch settings for easy configuration. All RAM chips are socketed to allow for easy memory add-on or replacement, Memory refresh for PDI series memory boards coincides with the planar board's refresh. No wait-states are required for expansion memory accesses. The PDI 256 is also available in 64, 128 and 192KB versions which are easily upgraded in 64K steps to a maximum capacity of 256KB.

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Every technology, profession, and discipline has its own language, but the age of computers has spawned phrases that no one comprehends.

Brave New Words

The manual typewriter is dead. Smlth-Corona announced in midMay that it had produced the last of them. The darn things were obsolete.

I held a private funeral. I placed my vintage-1950s Underwood next to my 1970s generic menual and looped a couple of spools of typewriter ribbon over end around them. Then I had a beer.

It isn't that I love manual typewriters.
What bothers me is their replacement. Not electric typewriters, which probably don't have many months left to live. I'm talking about computers . . . word processors . . . and worst of all. what they're doing to the language.

This is e sad period in linguistic history. We are in the early stages of the most impersonal age of modern living, Technodrivel is upon us. Silicon Valspeak high-technology's low-quality jargon—is destroying, the English Impage. And some say it's here to stay.

It won't be long until adolescents ask if

they can "eccess the car keys, so they can interface with compatible units and talk about PROMS"—not proms, those annual adolescent bacchanels of yore. And the

THE GENERAL public misses out on some great prose.

good-looking kids probably won't go out with anybody whose home unit is under 128K RAM. When it gets that bad, I'll reminisce. I'll

tell kids thet people used to speak English.
I'll tell them about manual typewriters.

Machines You Could Really Boot
When a manual typewriter fouled up.

you just hit it. Usually, a good swat unjammed the keys and everything was fine. A manual didn't stall, unless you ran out of ribbon. And even then, you didn't have to call a technician. Any dummy could replace a ribbon, and there were plenty of ink smudees on shirts to prove it.

Journalism was for hearty types in those days. Some of the old manuals required 40 pounds of pressure to type a letter. When a story was done, you felt a sense of accomplishment. And the manuals never talked back, never told you to keep waiting or to try again.

I've tried to warm up to computers because people keep saying they're such an important part of the future. Ohviously, they are. And I must, in the interest of fairness, admit that computers are remarkable beasts. But It would be easier to warm up to a colony of see slugs.

When I complein to high technology types about the convoluted acronyms, buzzwords and other nonsense that make

up the language of high technology, they tell me every other esoteric field has its own argot. But no other lenguage is so unintelligible and foreign to ordinary people. Sure, beseball hes its RBIs and ERAs, and medicine has its EKGs and resting pulse retes. But we're not forced to learn about these things. Computers, however, are "the wave of the future," and we better learn how to deal with them.

"Way beck when computers were as big as warehouses, the designers needed some way to describe what their computers could do," said Mark D. Johnson, e system manager in Hewlett-Packard's Corvallis, Oregon, offica, "They decided that the way e computer talks to a printer could be called "interface." New technologies evoked new words. They started saving PC because it was a lot simpler than saying personal computer. Thet's why there are so many acronyms and ebbreviations.

"A lot of people in this business work 10-, 12- and 14-hour workdeys. They use the language so much, they might get more comfortable with it than the common languege," Johnson observed. This may explain why so many computer buffs seem unable to turn it off, or communicate intelligently with regular folks. They live for at least, work) in enother world.

"One of the most unfortunate things about computer language is that it is so impersonal it sometimes becomes silly." said Edwin Newman, NBC newsman and the euthor of several books on English usage, "At times, perfectly sensible old

ANGE DM5213 is available for prototyping, and a DM5213/B screened standard 833, level B, is available for production.

terms are ignored so that new terms can be used. Let me give you an example. For years there was something called the 'work window.' When you were done with your work, whatever it might be, you took

it to the work window. But in computer languege it is called the 'input-output user eccess fecility.' How that is en improvement over work window I heve no idee. One is three syllables long, the other is twelve, which I suppose is why they use it."

Newmen has another favorite, "When the names of people who have died ere removed from the sociel security and medicare computer, it's called 'death termination interfece.' This is also known as 'removing the names.' "

HE 1/4U2C interfaces with all WOMBAT (Write-Only Memory-Bank Access Timer) CRT monitors.

Interfoce. Surely you've seen and heard the word dozens of times. But can you define it? Probably not. Neither can computer people, which is precisely why they use it.

"It's ludicrous. It means everything and nothing these days," said Hank Dobin, associete director of the freshman English program et Stenford University. "I can't say I'm much bothered by the intrusion of some computer and electronics terminology into the common language . . . but it's e simple matter of using end ebusing words, and e word like 'interface' is abuse. My belief is thet originally it meant 'interaction between two components or parts of a mechine,' and it's slowly evolved to mean 'interaction between two living things.' When we have so many better verbs, it's silly to use interface."

Stop the Press Releases!

A curious thing about technobabblers is that they assume people know what they're talking about. They also assume that we care. When they send press releases to the media, for instanca, they invariably type et the top: "FOR IMMEDI-ATE RELEASE." And usually, that's precisely whet is done with them. They are quickly released into circular files for death terminetion interfece. So the general public misses out on some great prose. For example, here's e portion of e press

release from Seeq Technology of San

The DM5213 is specified ot 350 ns read occess times and 10 ms byte write over the full military operating range of -55 degrees C to +125 degrees C. The militory temperature range DM5213 is ovoilable for prototyping, and a DM5213/B screened to military standord 833, level B, is ovoilable for production. Both are organized 2K by eight bits in the ledec (loint Electronic Device Engineering Councill-approved. metal-oxide semiconductor (MOS) bytewide memory configuration. They are ovoilable initially in a 24-pin, duol, in-line package (DIP), ond will be ovoilable in 32-pin chip

I can't wait to get my DIP chip carrier. Sounds like e great item to have elong on picnics.

My battle with computer language began about 3 months ago, when I moved to San Jose and what is known as Silicon Valley, home of some of the world's most edvanced technological development. If I had moved to Germany, I would have tried to learn German. Were it Paris, I'd have tried to learn French. In Silicon Vallev. I feit I should try to learn Valspeak. even though it sounded so foreign

So I went to pleces where computer experts hang out. I stelked the halls of the hotels and sat et the bars, eavesdropping on conversetions. One day the chatter was about CMOS, NMOS, CMOS-SOS, and other communicable diseases. I saw a guy in e cowboy hat and figured a guy like him could et least speak a regionel varient of English. He was even wearing cowboy boots. So I introduced myself. My new acquaintance turned out to be the owner of a firm that generates artwork for printed circuit boards.

"Most of the volume in the electronics industry is on peripherels, not on PCUs," the fellow-who, for lack of e less eppropriate moniker. I'll call "Tex"-expleined.

"Excuse me," I interrupted. "But I don't know what you're talking about." "That's OK," Tex said. "A lot of people in this business don't understand it."

lust as I suspected. "A peripheral is like a translator," he went on. "You can have all sorts of them

Say you bave an IBM typewriter. You hook up with a peripheral controller board and it does things. But peripherals can get vary complicated. I have a massiva circuit board that does nothing but talk back to the disk drive all day.

Big deal. I have kids who do the same thing.

Dawn of a New Era

I once mat a high-tech guy I liked. He's Ted Battes, an applications engineer for Silicon Valley Group, Inc. of Santa Clara. He said he doesn't understand the language, which is what I liked best about him.

"You might not get too many to admit it, but a lot of us don't understand the language," Bettes said, "But computers are so popular naw, people are picking up on wards like 'input.' They dan't know what they're talking about, but they're using words like that in a bar to seduce somebody."

LAROM-BASED integrated office subsystem management, and Multiple-Image Digital Read-And-Forget (DIRAF) circuits, the part will be released 2084.

A whole new dictionary of pick-up lines may be evalving.

This is why I like Mark D. Johnson of Hawlett-Packard. He understands same of the perils of high-tech abuse.

"We've already reached the point at which same people wan't believe anything unless they see it on television. To take it one step farther, maybe sameday people won't believe anything unless they see it on their computer terminal." Johnson said.

"And why should anybody interface with anybody when a computer can give them the information in nice, neat packages? It may get so nobody can stand to be within a mile of each other. Thay'll communicate with somebody across the world by camputer. But if the persons (or individuals) were in the same room, thay'd feel crowded "

Johnson was one of the people I met while eavesdropping on conversations at a high-tech conference. He was going on about TTLs, bipalar and SOS, which I believe are hamburger extenders. And that's when I got the idea to conduct a Silican Valspaak contest.

The Great Valspeak Competition I invited people to make up high-tecb press releases. I suppested that they load tham with buzzwords and acronyms, and try to make them as unintelligible as possible, just like the real ones. Legitimate press releases would be frowned upon. So would absence of levity. I figured maybe same fluent Valspeakers would realize how impersonal and ludicrous their language can be if they had a chance to make light of it. And a lot of them took advantage of the opportunity. Here's a sample:

> The latest advance in Super Extra Integratian Scale Technology (SEXIST) was introduced by Space-case Enterprises, LTD., of Guolola, o week ago next Thursdov. The NX2321SE45-12A incorporates CMOS-HEXFET, SOS-GaAs Gote Arrays, and Vocuum-Tube Bubble Both (VTBB) technologies on o 23.15 pin (typicol) semi-portoble industry standard SEXIST package. Soid to be useful in CRT I/O receivers, EAROM-based integrated office subsystem monogement, and Multiple-Image Digital Read-And-Forget (DI-RAF) circuits, the part will be released 2Q84, with protatypes avoilable for sompling 3Q85, somples ovoiloble for protatyping 4Q86, ond pinout available 5Q87.

This was submitted by Cliff Gold. Senior Engineer for the Oktel Corp., a video disc drive company in Campbell, California. Gold provided this footnote: "Thank you for this opportunity to express my frustration at the kind of thing I bave had to read for 7 years now."

One contestant sent a code for saying high-tech things that made no sense, but sounded good. His system involves four columns of 14 words each. You simply take one word from each column to form such handy phrases as: "Digital input

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VIEW MANAGER \$275

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TOOLS

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screen access, keyboard handling, a graphics interface, access to all BIOS functions, and much more is provided in 45 procedures. Six units are carefully crafted and documented to give you the information and flexibility you need. Everyone using IBM Pascal should have TOOLS. User Manual 530.

SOURCE CODE INCLUDED

TOOLS 2

\$100 The power of DOs 2.0 is supported

using high level Pascal procedures. Program chaining, DOS internal and external command execution, use of all available memory, extended file handling, and other utilities are some of the features provided. A general DOS gate allows you to access any DOS function from Pascal. These are the extensions to Pascal you have been waiting for. User Manual S30.

SOURCE CODE INCLUDED

VIEW MANAGER, TOOLS and TOOLS 2 run on the IBM Personal Computer and the XT TOOLS 2 requires DOS 20 TOOLS and VIEW MANAGER can be used with any



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ed luminence microprocessor," or "Variable spatial feedback keyboard." In the right bars in Silicon Velley, these lines can result in positive interfece. In the wrong bars, they can result in broken fece. Another contestant wrote:

Avoilable in standard 23 pin SIP (Skewed Inline Pockage) and the new ACC (Amphibious Chip Corrier), the 1/4U2C interfoces with oll WOMBAT (Write-Only Memory-Bonk Access Timer) CRT monitors. Plons ore ofoot to qualify the 1/4U2C to MIL-I-883 under section PA2/O (Plons Afoot to Qualify) and to the radiatio hardness spec of MOOG (Microwove Oven Operotors Guild).

The winner of my contest was Gene Fifield, employed by McDonnell Douglas Electronics in Palo Alto, Fifield ceptured this coveted honor by writing:

Filogy Technology announces 27128 WOM Write Only Memory. CAID (Computer Architecture Interior Designers) con interfoce this chip using our R2 (recently releosed) RNPROM 24128 Rondomly Non-Programmoble Reod Only Memory and transfer 128 kByte from RNPROM to WOM to octuolize o U2DT (Universally Useless Doto Tronsfer). Foster than 200 nf (nono-fortnites), the RNPROM con withstand 2x10(6) EVEMP os close os 2x2 (10) Kf +- mH (Kf-Kilo furlongs, mH-milli-Honds) u-proc bus requirements meet EIAGI-20 (European Institute of Apple-looso lockeys) osing AHTRI VLSI 10 (American Horsebreeders & Thoroughbred Rocing Institute Very Long Stretch Instruments). Filogy Technology onnounces: Monufocture of these two chins is being transferred to an undisclosed locotion in South Americo. However, oll emplovees will be given the opportunity to relocote near the new focility: Please be ready at the Greyhound bus stop in

Gilrov ot 9 p.m. Mondov. Fifield was selected as winner because it took me end the other four judges e week to reelize his press release made no sense. Apple-loosa jockeys was the first clue. If you plan to enter the Second Annuel Silicon Valspeak Contest next spring, I suggest you begin treining now by writing and saying things that have no meening. And remember these words of wisdom from Edwin Newmen, "There is e serious danger that as we move into this so-called high-tech era, there will be one group of people that understands the scientific and technological work of our time, and then, the great mass of the rest of us."

I plan to be among "the rest of us." In fact, I composed this story on my manual typewriter, a finely-crafted mechine that demands too much dexterity for any techno-jockey to operate.

And it didn't stall once. /PC

Steve Lopez, o columnist with the Sen lose News in Californio, is in the morket for o personal computer but is too confused to buy one.

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With INTELLICOM you will be able to communicate with the various data and timesharing services such as The Seurce and CompuServe. Additionally, since INTE supports he protocol used by virtually all remote CPM systems enough the world, all users can intractiantly begin to take advantage of the wealth of upolic commin reliable on these systems. Current, or potential, users of CompuServe can intrasmit and roundworld both branky and ASCI data with his error detection and rene checksum protocols allow for the verification of deta blocks trensferred (essuming appropriate support on the host end). This feature will be of great value in those optications where data integrity is puramount. INTELLICOM's documentation includes a detailed description of all protocols used along with machine readable examples or supposed on the trail of protocols and the trail of the protocols and the protocols are all the protocols are all the protocols and the protocols are all the protocols are all the protocols and the protocols are all the protoco

al INTELLICOM menu in Illustrated below

rminal emulativ

U - Terminal emulation with data capture - Toggle local echo (off)

Checksum protocol file transmiss Checksum protocol file reception.

nission - PTR/PTP protocol.

- Asci file reception - PTR/PTP protocol. - Toggle local display (on). - CompuServe Executive Terr

Intel Hex file trans nission - PTR/PTP protocol.

oke Cisk/File fo - Exit progrem.

INTELLICOM requires PC DOS 1.1, one disk drive and either a modern or direct communication to enother computer.

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WORDS ARE **NOT ENOUGH!**

Experience goes beyond words. We believe adventures should too. Asylum is the first adventure game for the IBM Personal Computer to feature 3-D graphics. Hallways recede into the screen as though you are actually there. Doors open and close. Beds, desks, and other inmates are drawn on the screen. Instantaneously! And unbelievably, NO GRAPHICS BOARD IS REQUIRED!

What is Asylum? Asylum is a real-time simulation that takes place in a building with 1500 locations. It is inhabited by crazed inmates, sadistic guards, and evil doctors. Your goal? **ESCAPE!**

Asylum understands complete sentences, not just choppy one and two word commands, Sentences like "Drop everything on the desk except the matches" are interpreted and acted on instantly. Further, the command "VOCABULARY" will show au the entire lexical dictionary, eliminating the need to seccontinues program designers you have never met.

Asylum supports printer output. If specified, all input and messages will be printed without slowing down the game. Among other thirses, this allows you to print the dictionary and/ or your inventory awany time. A panic button allows those of you playing on the job to emergency abort, and later restore, a game in progress (our abologies to your superiors). SAVE GAME allows up to 10 games to be saved on your disk. Since Asylum requires months of work is solve, saving allows you to resume a previously adjourned game

Asylum is brought to you in stunning machine language speed by Med Systems and Computer Application Unlimited, The authors wish you luck!

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OPERATING SYSTEMS/TODD KATZ

To paraphrase Nietzsche, "Is CP/M dead?" To paraphrase Shakespeare, "Thereby hangs a tale . . ."

Is CP/M Dead?

Once upon e time, before the Oeborne I. when microcomputers were being developed in garages and basements throughout the United Stetes, each mechine needed an underlying software system to menage file input and output (Rnowr as I/O) as well es messages to and from keyboards, screens, printers, other computers and—in those days—teletype mechines, and peper tepe punches.

As each mechine wes readied for matket o different, proprietary operating system was developed by the manufacturer. Meny of these systems were quite edvanced, baving been specially designed for one machine, end many included customized versions of their own languages such as BASIC. Among the most successful systems were AppleDOS for the Apple II computers end TRS-DOS for the Radio Shack family of computers.

For the small manufacturer or the computer hobbyst building his own system, developing an operating system was eweste of time. Unless vast amounts of inexpensive progremmer time were eveilable and a large market guarenteed, developing a unique operating system was like bringing e 45-1/5 rpm record turnteble to market; et best it might be a technical echievement, but there certeinly wouldn't be any music to oblev on it.

For the buyer of the microcomputer, the situation wes even more dismal. Not only were there very few peckages available for these proprietary systems, those that were evailable were of questioneble quelity end reletively expensive.

Enter Dr. Gary Kildali. a consulting programme with linel, the chip menufacturer Kildali wrote single-user operating system, called Control Program for Microcomputers or CPAM, for a home-bew computer that used Intel's new 8000 8-bit microprocessor chip. The beauty of the system was its competenses: It could essity manage files end smell programs on computer systems that provided for only ebout 15K bytes of random scens memory (RAM) and fewer than 150K bytes of disk

TODAY, CP/M IS being used on several hundred thousand microcomputers.

storage. Kildell offered his new system to Intel, which, in the true American tradition, decided thete market for such e system wesn't there end suggested he try his luck elsewhere. Not e smell-scale thinker. Kildell in-

stead opened the doors to Intergalectic Digital Research, later renamed Digital Research Internetional. (After all, what would the neighbors in Pecific Grove think? He offered his opereting system for sale to all computer manufacturers and made large portions of the system source code evellable to the general community of programmers. This was the key, since it allowed individuels and software bouses to put the new CPM system on computers even without the cooperation of the manufacturer.

Perhaps even Kildall was surprised when e lorrent of computer manufacturers came from the world over to his then tiny california compeny to buy, for as much es \$30,000, the rights to distribute the 8-bit operating system on a single manufacturer's computer. Today, less than a decode after the first experiments with the singleuser computer operating system, CPM is being used on severel hundred thousand microcomputers.

All was not perfect with CP/M and Digital Research, bowever, Learning e system originally designed for a teletype machine was not easy, the documentation was unreedable, and remeined that way from 1977 to 1982. But with euxiliery guides, tutorial tepes and programs, and lots of help from computer program manuels, most users maneged, end remein on good terms with CP/M. More critical were Digital Research's growing pains-or ebsence of growing pains. The company eppeared to stand still, unable or unwilling to revise and develop new products. CP/M-86, for example, arrived et least 2 years behind schedule (and opened what is known in

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the industry as a "window of opportunity" for MicroSoft, developer of the disk opperating system known as PC-DOS.) The recently released CPM-80 3.0 (known also as CP/M+) was also 2 years behind schedule, and so far, has not caught on with many users.

with now held the me like 1980 or early 1981 BM decided to make a quick entry into the microcomputer market with a machine based on larle 1980 Be 16-bit chip. (It has been said that calling the 508s a 16-bit chip and the control of the 1980 Be 16-bit chip in the 1980 Be 16-bit chip in and of chartry, the fact that test times the memory of the 8-bit chip 1980 Sand 2-80-bit 2014. At the time 1890 Sand 2-80-bit 2014. At the time 1890 Sand 2-80-bit 2014 to the 1980 Sand 2-80-bit 2-80-bit 2014 to the 1980 Sand 2-80-bit 2-80-bit 2014 to the 1980 Sand 2-80-bi

IBM Seeks Operating System The Jolly Blue Giant approached both Digital Research end MicroSoft, the Bellevue. Washington maker of MicroSoft BA-SIC and a number of other high-quality microcomputer languages, in search of the operating system. For one or several reasons negotiations between Digital Research (which at the time still had fewer than 30 employees) and IBM coliapsed. IBM turned to MicroSoft, which in turn called upon Seattle Computer, an S-100 computer manufacturer that had taken an early interest in the 8088/8086 support. Seattle Computer had designed what was then called 86-DOS to be compatible with properly translated CP/M-80 programs.

THAS BEEN said that calling the 8088 a 16-bit chip is an act of charity.

This was crucial, since there were very few programs that could run on the 8088. Shortly after MicroSoft bought the rights to 86-DOS and renamed it MS-DOS, IBM chose MS-DOS to become PC-DOS.

Although merketing, availability, price, personalities, and contractual requirements may have each been factors in

IBM's decision to go with MicroSoft, technical factors were certainly significant. MS-DOS, particularly in its earliest form. was, and is, considerably faster than CP/M because the map of the location of items on the disk was held entirely in memory. Thus there were fewer occasions to access the disk, a comparatively time-consuming operation. In addition, MS-DOS was designed to hold or "buffer" more data on disk in memory. For this reeson, programcopying operations under MS-DOS are much faster than under CP/M. Also significant, MS-DOS was, and remains, an easier system for e novice to learn and use. Recent innovations in MS-DOS 2.0, many of which eppear to be inspired by Bell Labs UNIX operating system, include treestructured directories, paths, pipes, and print spooling. Each of these has added considerable power to an already elegant tool. In addition, there is the ability to place a user-friendly "shell" around DOS 2.0. For example, the Wang Professional computer, which also uses MS-DOS 2.0, already has an operating system shell that mekes it possible to use nearly every feature of MS-DOS 2.0 from an interactive menu, complete with on-line HELP.

mentu, compete with on-line HLLF.
Whatever IBM paid MicroSoft for PCDOS, the amount could not heve been too
little. The selection of MS-DOS for PCDOS turned MicroSoft from a programming language house in on a full-fledged
operating system design facility. Immediately, hundreds of manufactures of microcomputers lined up et MicroSoft's door
for the right to market the same operating
system that wes evailable with the IBM
PC.

Although IBM selected the MicroSoft operating system over Digital Research's, rights to market both products-as well as the University of California at San Diego Pascal operating system (UC50-P)-were acquired. The only differences were the name (PC-DOS, which indicated a preference for the MS-DOS system), the release dete (PC-DOS was released months before CP/M-86), and the price (CP/M-86 is still being sold by IBM for \$240 compared to \$60 for MS-DOS 2.0). Furthermore, and perhaps e commentary on relations between the two companies, the version of CP/M-86 currently sold by IBM is many months out of date. If anyone still questions the trend. IBM's preferences became even more apparent with the publication of its latest software catalog. The Guide, It

does not list a single CP/M product.

Reversal for Digital Research

Such benign neglect resulted in a severe reversal for Digital Research. The creators of the de facto standard operating system for 8-bit computers found themselves with less than 10 percent of the market for the 18-bit personal computers and, by some estimates, found the CP/M-86 in use by fewer than 1 percent of IBM PC users.

Despite Digitel Research's failure to make beadway among the yast mejority of

$M_{s-DOS\,IS}$ considerably faster than

PC users, the compeny has been strikingly successful at setting software programmers to write programs for CP/M-86. In fact, most of the significant programs that have been "ported" over from 8-bit CP/M systems are aveilebie for both CP/M-88 and PC-DOS. Notable exceptions include, not surprisingly, the MicroSoft family of languages.

Why, considering e less than 5 percent penetration in the marketplace, would CP/ M be doing so well emong progremmers? Partially, because once the system has been moved to the IBM PC, making it function on both operating systems is not a major task. Another reason is that while most of the translation work on established programs was being done, through mid-1982 programmers and software houses were bedging their bets on the ultimete success of each system. Finally, programmers were using CP/M-88 to bring their progrems over to the 8088/88 chip. For example, the highly regarded Godbout CompuPro 8085/8088 development system only offers CP/M-88 with its dual processor system.

Rick Rump, creator of MicroShell, a UNIX-like system designed for CP/M-80 systems, recently discussed his partielity toward CP/M-88. "The biggest reason wby I am looking more strongly to CP/M-86 than to MS-DOS/PC-DOS has to do with the company that produced the operating system. Digital Research has demonstrat-

ed and promised to support a line of com patible operating systems supported by compatible lenguages and productivity tools. For a software developer, that is cru-

Rump described e recently completed crash project in which be was able to use CP/M-68, Digital Research's operating system for the Motorola 88000 microprocessor chip, to move a communication program from a 8-bit 8085-based system, to a 8088-based system and onto the 88000. "The tools and the appearance of the system in all three environments were consistent and the performance impressive." Rump said. "It is clear that MicroSoft has won on the 8088 chip and thet Digital Research won by default on the 8080 chips. What isn't clear is who will win across the board."

Although MicroSoft has indicated that MS-DOS 2.0 will eventually be competible with the Xenix operating system, thus providing a bridge to 68000 computers for MS-DOS-dependent software, that compatibility has yet to be demonstrated. in fact, if MicroSoft and IBM can be faulted at all, it would be on the competibility

Mike Olfe, a microcomputer software specialist with General Electric's Micro Task Force in Rockville, Maryland, noted that each of MicroSoft's three versions of PC-DOS (1.0, 1.1, and 2.0) hes hed a new diskette format. "In this aspect of the contest, Digital Research deserves credit for disk competibility. Under PC-DOS 2.0. WordStar is not working properly; Easy-Writer II has problems. Any software that thinks it knows what the disk formet looks iike wiii be surprised," Olfe said. Each time such changes are made, software publishers must release new versions of their programs end users must secure updates to their software. "When you make a change like that and you bave the kind of market share that PC-DOS has, users have to spend e greet deel of time just to catch up to the change. And meking the switch to the new system and format is not optional if you want to keep up with a rspidly changing market," said Olfe.

Digital Research is frank in talking about the situation with CP/M-88 on the PC. "Our relationship with IBM has not one too well to date," explained Kevin Wandryk, a Digital Research product manager. "IBM is offering all three operating systems but only supporting one."

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Taking a philosophical viaw, Wandryk edded, "IBM hes historically shown thet in the mainframe and the minicomputar worlds they want the whole pie. In large

RM WILL continue playing various operating system suppliers against one another.

systems business, thay have naver reliad on outsida vendors. My personal faeling is that in the long run, the same thing will heppen to the oparating system suppliers that happened to the makers of hard disks and color monitors when IBM released their XT and color monitor."

There may be something to this theory.

For exemple, in choosing en operating 86. system of preference for the IBM PC 68000. IBM salected the UCSD p-System over Xanix, MicroSoft's UNIX-lika 68000 system. And rumor has it that, for the UNIX operating system being considered for the PC or XT, IBM is looking at places other than MicroSoft. According to this scanario, IBM will continue playing various operating system suppliers against one another until its own proprietary system or systams ere ready for release.

The turn of avents has altered, perhaps permanently, Digital Research's image as e self-satisfied concern content to ride the wave of original equipment manufacturer (OEM) damand for its operating systems. In fect, the company has now quite affactively cast itself in the "We Try Harder" role mada famous by Avis, the number two car rental agency.

Efforts to Bring Back Users Tha following are among the major marketing efforts mada by Digital Research to bring more usars back to CP/M-

 A new version of CP/M-86, costing \$60 was released in March. The new system includes the highly regarded GSX graphics interface and a print spooler. in eddition, participating ComputerLands have been giving the CP/M-86 operating system away to buyers of new PCs.

 Concurrent CP/M, released in 1982. offers high-quality single-user multitasking. It allows e single user to menage four tasks at once, with each task residing in mamory. For exampla, a word processing program could be run at one level, a daily eppointment calendar/alarm clock could be running at a second, a program could be being compiled at e third laval, and a listing of the source code for thet program could be printing on a printer through the fourth concurrent task level.

In order to make effective use of Concurrent CP/M, which retails for \$350, rather large amounts of memory are required: 256K bytes is considered a working minimum end 512K bytes is recommended for four concurrent tasks. A hard disk or fixed disk such as the one aveilable with the IBM XT is also highly recommended.

 In June Digital Research announced that most of its 16-bit languages and programming tools including CBASIC, Pascel MT+, PL-1, C. Access Meneger, Display Managar, and Levei II COBOL would be immediately available under PC-DOS. Heretofore, Digital Research's CP/M-86 languages and other programs, although highly regarded, have not been in heavy demend on the PC because they were not

relationship with IBM has not gone too well to date.

evaileble under PC-DOS. Now users of the PC can leern to use end rely on most Digitel Rasaarch products without heving to switch back and forth batween operating systams.

CP/M-68 has been introduced for developmentel microcomputer S-100 bus systams such as the CompuPro. This version of Digital Research's CP/M family of





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operating systems, unlike those written for the 8009 and 8086 family of Intel computer chips, is written almost entirely in the C language. Thus, CPM joins UNIX, also written in a language so portable that "putting the system up" on a new microprocessor chips may take days instead of months or vesar.

Hope for CP/M

Digital Research is particularly hopeful that Concurrent CPM will woo users back to the CPM family of computers. "The IBM PC is a particle environment for a Concurrent CPM. It is the first package that you take advantage and see the benefit ledy out lake advantage and see the benefit of a 18-bit system over an 8-bit system over an 8-bit open necessary of Concurrent CPM and out new low-priced, enhanced CPM-86, we predict a 20 percent penetration into the PC operating system market place in the next

2 to 4 months," said Wandryk. Perhaps the most persuasive long-term argument for CP/M-88 as a software system is its full and easy compatibility with CP/M-80 and MP/M (the company's multiuser system). For example, the DEC Rainbow, which has chosen primarily to support CP/M-88 over MS-DOS, can read disks designed for the DEC Robin, an 8-bit microcomputer. Not only that, by looking at the files, the Rainbow can sense whether a program should invoke the 8-bit or 16-bit processor. And the 8-bit CP/M-80 data files can be read and used by CP/M-88 programs without conversion or modification. But this argument is not really applicable for the IBM-PC.

It is also significant that Digital Research has chosen not to relesse its languages on the MS-DOS systems for computers other than the IBM PC. This is clearly an effort to convince manufacturers to continue offering and supporting IPM-88 and Concurrent CPM on their 18-bit machines. It also represents a matesting stratesy for Digital Research.

"MicroSoft's MS-DOS is a pretty good product and they have done a petty good job marketing it. I don't want to cut them down. Having IBM marketing their products helps. But it is a double-edged word. Companies out there like Digital Equipment Corporation (DEC) and National Cash Register (NCR) or other large system manufactures can't survive by offering a PC clone. Instead we try and provide for them the total CPM solution; this gives

them an image or an edge in marketing their computer against the IBM PC," said Wandryk. "Both NCR and DBC," he added, "have decided to offer Concurrent CP/ M on their new personal computers." In terms of prestige software, Wandryk claimed that both VisiCorp's VisiOn and

PIGITAL
Research has been
strikingly successful at
getting software
programmers to write
programs for CP/M-86.

Lotus 1-2-3 are becoming available under CP/M-88 and Concurrent on a number of

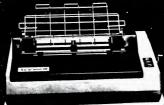
16-bit machines.
Is a 20-percent market share enough?

"Even it we do lose this marketplace and it goes totally to MicroSoft, this is only Round Two. There is the 88000, the [Intel] 8288 and 8386, the [National Semiconductor] 16932, and we have a leading edge at the present time in operating system development in each of those areas. We certainly won't be blindstided again," Wandryk concluded.

Back to the original question, "Is CP/M dead?" The answer for the moment and most likely for years to come must be, "No." But for the average IBM PC user and those who are writing software strictly for the PC, the existence of a first cousin to PC-DOS will make little difference and be of little concern. In fact, the release of Digits! Research programs to work under PC-DOS can do nothing but reduce the need for CP/M-86 on the IBM PC. For these PC users-barring the immediate need for a multitasking system or the long-term failure of MicroSoft to upgrade MS-DOS to multitasking--- CP/M-88 is worse than dead, it is irrelevant.



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You Can Talk To Us! Spin Physics packs it in with a new diskette that can hold up to 10 million bytes of data.

High Density Diskettes

A floppy diskette capable of holding 10 million bytes of data was shown for the first time at the recent National Computer Conference (NCC) in Anaheim, California. The diskette is a product of Spin Physics (a unit of Eastman Kodak) and goes by the name "Isomax."

The difference between Isomax disastets and existing diskettes in in the testes and existing diskettes in the stets are desired guidantees in a final disket netic coating that stores the data. All disknoted from the diskettes are coated on the disktets are cased in a final diskette the surface by changing the direction of magnetization of the tiny magnetic magnetization of the tiny magnetic diskette depend on the quality of the diskette depends on the quality of the control code coating on the disketter's surface.

The isomax medium manages to cram is lot more data onto the same amount of surface than other media because the particles of the coating are much smaller, more regular in shape and size, and because the surface of the diskette is smoother.

Densities are also incressed because to comes allows what is called "perpendicular magnetization." On most other distribution of the control of the contr

The Isomax coating has already been used by Kodak on a specialized form of videotape. It would be suitable for coating Winchester disks or any other magnetic medium with the same sort of density advantages. Thus, 5¼-inch Winchesters holding 50 million bytes of data or more become conceivable.

Why start with diskettes? "We had to start with something," says Spin Physical 'director of marketing, William Kroon. He says that since software packages become increasingly larger, software houses have expressed an urgent mode for a high density software-delivery medium. In addition, high density is diskettes would be an ideal medium for backup of Winchester disks, a process that is inconvenient and time-consummation in the consummation of the software of

ing using today's diskettes.

Removable Winchester disks have been proposed for these tasks, but, according to Kroon, they would be more costly than the Isomax alternative. The removable disk would also require a more complicated mechanism and therefore be more subject to failure. (See "Hard Disks Made Easy." PC. Volume 1 Number 10, page 265, for a complete discussion of removable Winchester disks.)

Of course, no diskette drive on the market today can read or write data at the high densities that are possible with the Isomax medium. Spin Physics, naturally enough, minimizes the difficuity of building such a drive, suggesting that all of the technological elemeots oecessary already exist and have proven feasible. The company almost makes it sound as if Shugart and Tandoo and the other drive manufacturers need simply

WOULDNT you expect that if it offered a real advantage, we'd have seen more action?

go oui back to the warehouse, pull a few components off the shelf, and throw logether a oew, ultra-high density drive

Shugart and Tandoo aren't quite so cavalier about the Isomax-compatible drive, aithough they agree that the quality of the recording medium is indeed limiting the densities of current

drives.

Tandon's public relations spokers am, Alfred Erickoo, pointed out that the Isomax medium isn'i as new as all that. It was shown to the drive manufacturers a year ago at a sciotific conferency; give haven't seen drive manufacturers falling over one another to announce owe drives. "Wouldn't was well have seen omore action" and well have seen omore action" as well have seen omore action" as well have seen of the conference of the give "We're evaluating it, of course," says Erickson. but PC was unable to extract a prediction on when and in what form we'd see real products.

Shugart is also "exploring" the isomax medium, according to a company spokesmao. But Shugart is exploring lots of different options, different media, and different technologies. It is obviously not prepared to make a public commitment to this particular recording medium at this time.

So, if you need a high density diskette today, doo't hold your breath. If you're going to need ooe io the future, you may get ooe. But whether the disks will use isomax is not yet clear, so take my advice—don't put all your mooey into Kodak stocks!

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ORDER TOLL FREE: (800) 531-5475 (If outside of Texas) (512) 250-1523 (In Texas) 13010 Research Blvd., Suite 101, Austin, TX 78750 No, the IBM PC has not acquired sight. But it may play an important role in the computerized link-up that makes inexpensive industrial robots a reality.

Eye Of The Robot: The Optical PC

It may not carry e lunch bucket or punch e time clock, but the IBM PC could still find itself a job on the fectory floor. An inexpensive robotic vision system that uses the PC to help identify and react to assembly line components is currently under development. Until recently, robotic vision systems have found limited commercial applications in the U.S. due to constraints imposed by speed, expense, end reliebility. The arrivel of powerful, reletively cheap microprocessors has spurred research and development work thet could result in a proliferation of working robots with television camera eyes. Dozens of universities have research projects under way, while numerous smell hightechnology compenies as well as corporate giants like General Motors. General Electric, IBM, Fairchild, and others are investigating the potential or preparing to enter the market.

The development of fully autometed fectories hes been held back by problems with mechine visions systems. But a variety of systems has now began to meke the treasition from the leboratory. Industries mechine vision systems now on the market can inspect turbine bledse and computer keyboards; count paper cups; read labels; sort parts stored in bins; and control welding end essembly operations. But the cost of the systems—from \$5,000 for the cost of the systems—from \$5,000 for vision systems—welding and assembly robots—put them beyond the reach of many businesses.

Generalized vision systems that epproach human capabilities are not technologically possible at present. In fact, the current doctrine is that e robotic vision system should be designed to fulfill a specific function, rather than an all-purpose role modeled on human vision.

Current thinking also dictates thet robot systems should not cost more then 2 years' worth of the wages and benefits of the workers they replece. Even though robots work 24 hours e day, need no lunch breaks on biddieys, take no sick leeve, and no lunch be perform the job to the same lavel edges, take no sick leeve, and considered the maximum cost at which considered the maximum cost at which no robots can be commically justified. The hour probots can be commically justified. The notation of the robotic vision of the robot is that it should not cost more than one-tanth of the antire robot swystam.

A major factor in the decision to develop a vision system based on the IBM PC was thet computer's low cost, said Dr. Neil Stewart of the University of Montreal. "We wanted an inexpensive system which we could afford, and which could plausibly be transferred to the factory floor," he seid. The ability to do fast floating point arithmetic with an 8087 coprocessor installed in the PC was also a major reason for the choice. The PC-based robotic vision system, like most other vision systems, consists largely of off-the-shelf TV cameras end computers; the software is what really distinguishes the various systems.

PC Splits the Work

The work of handling visual data and controlling the robotic arms is split between the PC and a bost computer. The PC vision system normally works in an

MOST VISION systems consist largely of off-the-shelf TV cameras and computers.

infinite loop, in which it digitizes and analyzes the image, recognizes objects and transmits updates of the scene to the boot. A single black-and-white talevision camera is the "sys" for the PC. (In experiments on stereoscopic vision the system uses a pair of color cameras as eyes.) and pair of "frame garboes," inserted in the PC slots, samples the image from the camne, forming edigate picture 256 pixels by 320 pixels. However, the vision systam is observed uses a window only 256 pixels for the property of the pixels of the pixels of the system of the pixels of the The PC identifies all the objects in a scene and signals the host that it recognizes fixed objects that, because they ere not going to move, do not need to be tracked. The host computer can decide it only wants information about certain mobile objects and designate than as "currently relevant." The PC tracks all objects that only notifies the host of the locations.

of currently relevant objects.

According to Dr. Stewart, the shepe, direction, and valocity of an object are colculated by the PC; the paths of moving objects are thus axtrapoleted. While the entire image consists of en area 256 pixels square, only smaller windows—in which an object is expected to oppear—will be an elegated at each stap in the program loop.

Toward Speech and Computerized Understanding

The obstacles to advances in voice recognition technology are strikingly similar to the problems facing robotic visionaries.

So you telk to your PC—particularly when it does something nasty—but does it really understend? Does it care when you cares, present, fatter, or plead with It? Not likely. But advances in computerized speech recognition could put systems with limited speech recognition capabilities on the market in the near future. Then perhops your PC will really know end understend whet you are saying to It.

In 2 to 4 years, technology being davaloped by IBM and Matsushita will result in the introduction of voice-activated typewriters capable of processing continuously spoken speech, according to Alan Bridges of VeXP Research/Systems Ltd. At present, commercially available voice recognition systems are only able to understand individual words or, at best, limited vocabuleries of a few bundred words. But work at IBM's T.J. Watson Research Center has succeeded in producing a system that showed 93 percent recognition with a 1,000 word vocabulary. Still, commercially faasible voice recognition systems would require a vocabulary of 2,500 to 5,000 words, Mr. Bridges said. The structure of the Jepanese end Germen languages makes it likely that voice-activated word processing systems will appear first in those countries

The problems involved in speech recognition are similer to those facing robotic vision systems: distracting backgrounds, in this case noise; input varietions, largely the result of individual differences in speech patterns; and the lerge number of words that might be used. Simply deciding where one word ends and another begins is tremendously difficult for a machine.

Basic speech recognition systems disjutice a voice signal end compare it with a stored reference pattern or vocabulary, if a system is used by many different people, individual veriations in pitch, intensity, and problem. The inture of practical, linexpensive computerized speech recognition depends heavily on the ability of chip designers to put highly edvanced speech recognition algorithms into integrated circuits, which could then join other complex systems on individual silicon

The militery is the largest markst for speech recognition equipment todey and is expected to continue to be so throughout the decade. Uses of speech recognition systems include voice response systems in military aircreft, training systems, and access control for deta systems end facility.

Potentiel commercial uses include telephone ordering systems for goods and information, and systems for conducting automatic banking end credit transactions by telephone. In industriel settings, speech recognition systems can speed machine-tool control and programming, inspection and quality control, and factor y floor date entry. Voice-activated word to voice commands to dim the lights or the comment of the

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The whole image is sampled periodically in order to detect new objects thet may appear. Information on the location of each currently relevant object is kept in the host memory, giving it a "map" of the environment in which it is working.

Early versions of PC vision software allowed the robot to recognize only a small number of predetermined shepes, such as cubes, cones, and spheres. Newer versions of the software will enable the PC to learn the shapes of objects in its field of vision. This ability gives more flexibility to robotic vision systems. Further, it eliminates the need to write separate software for each object that has to be recognized. It also makes it much easier to recognize parts that mey fall onto a conveyor belt in several positions. For example, if e part ends up in four positions, the computer can be taught that each of the four views represents a single object.

Programming for the vision system is done in the IBM macro-assembler language, meking program development fairly easy, said Dr. Stewart. Ease in programming is important, as the software will continually be changed as work is done on developing elgorithms for vision and analvsis. Dr. Stewart said.

A PC-based robot system capeble of working on a factory floor is at least a year or two away. Such a system would involve more than the PC-besed vision system. It would consist of a veriety of hardware and

EASE IN programming is important, as the software will

continually be changed.

software, including ultresonic and laser
rangefinders, end a computer graphic system allowing a wire-frame graphic simulation of the movements of the robot

arms to aid in programming. The goal is for the system to be able to recognize a number of different parts, pick them up with a robot arm, and assemble them automatically. A major question at this point is, "Can the IBM PC handle the calculations quickly enough to function effectively on an assembly line?"

The Ultimate Nightmare

Computer vision is still very crude compared with human vision. "We take our own ability to see for granted, do it effortlessly, and we instinctively feel no reason to believe that the interpretation of [visual] signals may be e very complicated task," said Dr. Tony Kasyand of Canada's National Research Council. But, he said, those who have tried to develop programs for robotic vision systems have learned that the complexity of human vision should be respected. "There is a profound difference between the ability of our own vision and that of mechanized or computer vision systems. Understanding of complex scenes is easy for humans but nearly

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impossible for computer vision sys-

Many researchers in machine vision say it would be e misteke to attempt to use human vision as a model. A robot's depth perception, for example, is more affectively echieved with sonic or laser rangafinders then by using the slight parallax thet results from the separation of two eyes as in humans

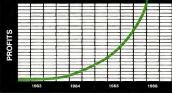
Simple things-a shedow across an object, another piece of equipment partially blocking it, an object facing in a direction that the computer isn't programmed to recognize-can all confuse a robot's vision system. Dr. Kasvand said visual scenes are often extremely complex, and even such reletively simple things as bins or buckets of machine parts present an enormous task for robot vision systems. "The ultimate nightmere of an intalligant robot system designer is likely to be a disorganized repair shop for fixing cars, for example. One has to look for tools to disassemble a mechanism, replace defective pieces, inspect and clean the remaining ones, and then put the mechanism back together again by using whetever tools are handy. The required scene anelysis, image understanding and object recognition, the decision strategies and planning, end the required dexterity and control of two manipulators is far beyond our present know-how in computer programming and hardware design.

To overcome the limitations of robotic vision, it is necessary to, in the words of Dr. Kasvand, follow the "triple S rule": simplify, simplify and simplify. The number of objects in a scene and the clutter in the background should be kept to absolute minimum. If more than one object appears, the objects must not touch or overlap, or they will appear as unrecognizable blobs. Lighting is often a decisive

HE "TRIPLE S rule": simplify, simplify and simplifu.

factor in the success or failure of vision systems. Lighting the objects from beneath or from one side, to create black-andwhite silhouattas, is a commonly used

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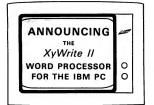
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XvQuest Inc. P.O. Box 372 Bedford, MA 01730 technique for keeping images simple. Where objects are moving, e flesh of light can be used to "stop" them. For complex objects where surface shapes or deteils

CURRENTLY, most robotic vision systems are used for inspection and sorting of varts.

must be determined, a strip of light may be used. If an object in the scene is flat, the strip of light will be straight. Rounded objects will cause the strip to oppear curved, while irregular shapes will cause bends, kinks, and breaks in the light strip.

Anything Goes

In dealing with particular problems in robotic vision, any trick that works is acceptable, Dr. Kasvand said. "Consequently, the possibilities for robotic vision are mainly limited by our imaginetion and the cost effectiveness of the solution." Image interpretation in an industrial setting can be very simple or very complex. A system that checks labels on bottles will be much simpler than a system that chooses parts from a bin and assembles them. Currently, most robotic vision systems are used for inspection and sorting of parts. New inspection systems are being installed in American factories at a rate of between 400 and 500 per year. Ultimately, from one-third to one-half of the 700,000 factory workers involved in inspection and checking operations could be repleced by robotic vision systems. However, by the end of the decade vision systems will be used primarily to guide robots working in assembly systems. Visionguided robots are already being used by Lockheed-California to pick parts from storage racks, position them in e riveting machine, and inspect the completed work. Estimetes indicate thet from one million to three million robots will eventuelly be in service in American factories: between 500,000 and 800,000 of the units will require robotic vision systems of some sort. /PC

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If you've spent any tima on word processors, you heve probably discovered that no single program can do averything for everybody. Word processers are collections of trede-offs. When shopping for a word processor, you decide which capabilities you need most and search for the program that comes closest to filling the bill. Some specialized capabilities heve been largely ignored by word processor designers, perhaps because they feel the size of the market does not justify the investment. For example, most word processing programs can't support special notation, and those that can ere often uneble to print these special characters

once they are set into text.

One new word processing package called ProofWriter, recently released by Image Processing Systems of Madison, Wisconsin, supports and prints the extended character sat and performs underlining end scripting on most printers. The progrem trenslates speciel character codes and can even create new cherecters on many printers. It also includes mail-merga and spelling-check features.

ProofWriter is actually a set of programs designed to perform specific tasks.

YOU WILL
never have to patch the
ProofWriter editor with
DEBUG if a new printer
comes along.

The main modules are an editor, a print formatter, end a spelling checker. The progrem is enhanced by a printer configuration file end a utility for modifying tha dictionary. The modular design involves the inevitable trade-offs but allows each program to work within its own functional range. You will never have to petch the ProofWriter editor with DEBUG if a new printer comes alone.

primer comes along.

The ProofWeel of hivders, a full index, and a table of contents. Commands executed the contents of the co

ProofWriter can support both singleand double-sided drives, or one drive and one hard disk. A self-copy routine creates a backup, then arassa itself. Although the programs are not copy-protected, they will not work unless the hidden file produced by the copy routine is on the program disk. The package has a 90-dey werranty and replacement program disks are eveileble for St.

The ProofWriter Editor

The editing program operates in two

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stages: main menu and command. After entering the main menu from DOS, you can usually start a new document or modify an existing one (by typing 5 or M; most monic leyartness.) If you view the Directory, of fail list appears and remains on the secrene as you continue. After an additing assiston, you can either fall are sults, tamporarily leave the editor, return to tha com-

THE EDITOR
works entirely in
memory and is very
fast, but requires a
minimum of 128K

mand level, or simply quit. If you try to quit before filing the editad document, you must verify your intentions. Although you can ersee e file, you do not have ful access to DOS and therefore cannot

rename, copy, or merge. The editor works entirely in memory and is very fest, but requires a minimum of 128K RAM. With this much memory, there is room for a 32K document. On a 144K system, the editing buffer can hendle a 48K document. For larger documents, you are required to edit the first part of the text end file it before reading in more. Function key F2 does this autometically. Total document size is limited to ebout half the disk size, since the editor retains the original document as a backup copy. If there is not enough room on tha disk to write the newly edited fila, the program notifies you, giving you a chance to create more space by erasing unwanted files. The print-formatting program is capable of handling files of any size.

capanie for transming new of airly size.

The Proof/Write reditor offers a wide variety of features that a excessible by a single keystroke. Each letter or function single keystroke, but the single keystroke of the property of the property of the property out of the size of the property out the size of the property of the size of the si

mode you are in. All text wraps to the next line eutomatically.

Other standard features are implemented in a similar fashion: For find a string. T for transpose two charecters, G for globel search and replace. X marks the beginning and end in block operations. Zap (with a capital Z) does just that; it erases a block—permanantly. The program asky out overfly your intentions before executing since there is no wey to recover zapped text.

Text can elso be daleted by charecter (D or Del), word (W), or line (K) at a time. For restores the last deleted word or line (this feature allows you to transpose words). The editor does not includa an adjustable help level, but by typing H, you can gain access to an on-line help menu that contains all editing commands.

You manipulate the cursor in standard word processor style: by using the arrow keys to move to the top or bottom of the screen, to the left or right e word at a time, end to the beginning or end of a line. PgUp and PgDn move through the document e screen et a time, allowing you to go to the beginning or end of the document.

Under the ProofWriter editor, the function keys serve special purposes. F1 backs up the document by writing e flic called Memory on the disk and can be used any number of times during an editing session. Keys F3 to F3 are phrase buffers that can be loaded from the editor with a string of text up to 256 characters long. These strings, inserted into text by a singla kaystroke, are stored in a file called Setup.

Multiple Key Commands

Since the standard keys are used for standard faatures, the Alt and Ctrl key sequences ere reserved for separata functions. The Alt key gains access to the IBM extended-character set (those characters with ASCII codes greater than 127). To enter one of these special characters, you hold the Alt key down and type in the code for the symbol on the numeric kay pad. Twenty-five of the symbols can be assigned to Alt/latter-kay sequences, making special character entry aven easiar. I often use Alt-S end Alt-W to generate e lowercase and uppercase sigma (σ and Σ). Although these keys are set for mathematical notation, they can be customized to accommodete a foreign language or a grephic-symbol set by reassigning the

keys to the configuration program, which rewrites the Setup file. Unfortunetely, the editor does not itst the current symbol assignment. To overcome this, I simply wrote a document that lists the configuration table, printed it, and hung it on the wall behind my computer.

To embed some of the PC control codes directly into your text, enother set of Alt-key sequences is evailable. Alt-1 through Alt-5 will insert a carriage return, line feed, escape, backspace, or oull, respectively, at the cursor position.

The editor uses four sets of Ctrl-key sequeoces to perform oo-screen formatting. Ctrl-U, used to underline text, is canceled by Ctrl-Y. Another set displays emphasized print and can be used to combination with the underline keys. Superscripting is initiated by Ctrl-S and canceled by Ctrl-D. Subscripts use the reverse sequence. Since scripts do oot appear oo the screeo io the same way as they appear on paper, the editor displays them in reverse video. All of these commands embed a hidden control character in the text, and it is sometimes necessary to use the Verify command (V) to ascertain whether a character actually occupies a space that appears blank.

ProofWrier provides another set of Cirl-ley sequences to create "faille" or indeoted paragrephs. To start ao indented paragreph, move the cursor to the place where the alternate margin should begin and enter Cirl-C. All subsequent text will be left-justified to this column. When the indented paragraph ends, Cirl-X cancels the margin. Several Cirl-C sequences can be used to set up en outline, but they are all canceled by a single Cirl-X.

A similar feature is especially useful for program writing. The editor allows you to toggle on an auto-fodeot switch that causes each new line to receive the same ounber of tabs as the previous line. Entering another tab moves the cursor even farther to the right and moves the backspace one tab to the left. This is useful for structured progrems in which the indeotation level indicates that a set of commands is part of the same looical group.

To turn on the switch, hit the S key, which sets the display parameters. You can also set the line length and the tobs (up to nine tabs are allowed). Changing the parameters has an immediate effect on the text when you return to command level. While in the Display Parameter menu, you

can also view the Help menu for printer format commands.

Formatting a Document

Since a separate program bandles priotiog, many of the features that affect a prioted document are not aveilable onscreen while using the editor. The formatter contains an option to preview the document, but in order to gain eccess to it, you must leave the editor and enter the formatting program. This takes time, end can be irritating io the fioal stages of preparing text for printing. This is my most severe criticism of the ProofWriter package, but the trade-off is that the formatting program is very adept at controlling the printer. Nevertheless, it would be helpful to use extra memory to bring both programs on line at the same time, especially when viewing page breaks.

The formatter cootrols the prioter through format codes that the editor embeds to the text. Most of these take the familiar @-sign form, and the actual codes sent to the priote are accordated in the Set-up file. ProofWriter includes Setup files for over text different prioters. The Config program can either customize an existing Setup file create a new one.

Format codes are provided for a large mumber of prioter features, iccluding senlarged, coodensed, and italicized type. Proof/Writer also supports slogle, double, and triple spacing, as well as full margio control. Pages can be ounsbeend at the top or bottom (ceoter, left, or right), and can be preceded by a perfix. Using the alternating page option, you can add extra margio space on odd-coumbered pages to make

UNDER THE ProofWriter editor, the function keys serve special purposes.

room for bioding. Numbering can begio with e oumeral other thao ooe, but oonnumeric schemes such as Roman oumerals are oot supported. Type can be ceotered or right-justified. Headors, footers, and footootes may be iocluded in a document, and six user codes are available for special printer features.



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Special Capabilities

ProofWriter includes a mail-merge feature that uses three codes to control text assembly. The command @MN desig-

PROOFWRITER includes a mail-merge feature that uses three codes to control text assemblu.

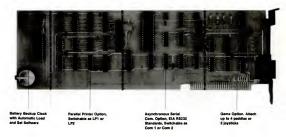
nates the file that contains the inserts for the main document. The "merge in" code, @MI, begins the actual mergs, and taxt is read in from the second file until the command @ MF (in the second file) is ancountered. The merge-in code can be placed in the main document any number of times. Different sets of inserts can be used to create custom letters. If your address list is maintained by a database management program, however, the program must be able to write standard DOS files with the @MF commands ambedded to the proper places in order to use the program directly with ProofWriter. For some applications, it may be easier to use the editor feature. "Read a file from memory," to assemble documents from boiler-plate paragraphs.

Subscripts and Superscripts

The formatter underlines tax by sending a carriage return without a line feed, then underscoring the proper characters. A similar sequence is also used to over-strike. For printers without subscript and superscript capabilities, the formatter media-shead, and when it encounters a line with a superscript in it. It feeds out a shalf-line space instead of a full-line space. After printing the superscript, it feeds a half line, then prints the text.

The formatter priots a subscript by parforming the half-line feed after the text line is printed. Even if your printer does support scripting you may still water to use this formatting option since it is faster and avoids reverse line feeds that can cause the paper to fall out of alignment. All subscripts can be written in one pass without repositioning the paper for each subscript. The methods used for underlining overstriking, and scripting are chosen

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by default if the Setup file contains no control codes for these features. The system becomes confused, however, if you try to do a subscript on a subscript.

Character Translation

Another file called Altset handles special character translation. In the Config program, after you have assigned a special symbol to an Alt/letter key sequence, you must enter the codes that will be sent to the printer in place of the IBM character numbers. If you are using a printer that also contains these characters, this is a simple one-to-one translation. With other printers, however, it is not so simple. A daisy-wheel printer sometimes requires several codes, using backspaces to overprint several characters, and it may not be capable of printing every special character. If you are using a printer with dotmatrix graphics, you must supply it with a sequence of codes in order to enter the graphics mode, then provide it with another sequence of codes that individually fire the pins on the print head. On most matrix printers, this would require about 10 to 12 codes per character. Any number of special characters may be translated: you are not limited to the 25 assigned to the Alt keys.

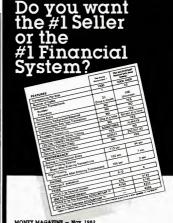
Currently, the Config program can automatically generate the codes used to create characters on an Epson printer (with Graftrax) or on the new high-resolution Toshiba printer. The program creates a matrix of the proper size on the screen. and you must move the cursor and "turn on" the dots needed to construct the character. This is not easy, particularly on the Toshiba P-1350, since it constructs each

 $Y_1 = \beta_0 + \beta_1 X_{11} + \beta_2 X_{12} + \epsilon_1$

β - N (β, σ2 (X'X)-1)

 $\alpha f(X|x) \Pi(x) dX$ $\Pi (\propto |X) =$ Figure 1: Two examples of the kind of mathematical equation that can be printed by using ProofWriter.

character from a matrix of dots, 24 rows by 21 columns. With this printer, you must send about 80 codes for each character. Fortunately, the ProofWriter package includes an alternate character set for mathematical notation designed for the Toshi-



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ba and the Epson. Factory support is available for other printers.

Once generated, the code sequences for these "print macros" are permanently stored in the Altset file. There is no limit to the number of codes sent to construct each character, but the file can only hold sbout 3,300 characters altogether. Since most people writing in special notation use only about 20 to 30 symbols, however, this should not be a problem.

Mathematical Writing

Since mathematical writing is usually full of equations, the formatter uses a command that moves the printer into "equation" mode, where it feeds in half-line increments. You would use this command to write equations similar to those in Figure 1. Each of the expressions appears as several lines on the screen, but each is compacted when printed. You can also use this mode to handle the subscript-onsubscript problem mentioned earlier.

Two additional format commands, designed to keep blocks of text together, are also used in methematical writing. A conditional page eject (@EI n) begins a new page If fewer than n lines remain on the current page. The floating keep (@FK n) keeps n lines together for printing, but fills

ROOFWRITER includes a spell-check program that features both literal and wordroot search modes.

in the rest of the printed page with text that actually eppears after the block. Although the ProofWriter package includes Setup and Altset files for a variety of printers, some printers are not directly supported. Nevertheless, you may want to produce different setups for different disks; for example, I have one disk configured for pica type and another for elite. To create a custom Setup file, you must run

the Config program, answering a series of questions in order to supply your printer with control codes. One option sends output to the serial port and allows you to choose the baud rate. There are about 50 questions in all, but any code query can be left blank. One interesting set of questions concerns the screen attributes you wish to use; you can decide how the text will appear in the editor. This option allows you to produce full-color word processing on the proper monitor. Using e monochrome monitor run by a color adapter, you can eliminate the "washed out" text that often eppears when the color card discovers that it cannot underline and substitutes e color that may be of lesser intensity instead. Or, if you really wanted to go crazy, you could make underlined type blink on and off and make regular type appear in reverse video.

The Spelling Checker

ProofWriter includes a spell-check program that features both literel and wordroot search modes. The words indicated as spelling errors are written to a file, accessed by the editor, and highlighted in reverse video. The spell-check program works well but is compromised by e limited dictionary that contains only about 45,000 words. Fortunately, the dictionary can be modified, and running the proofreader against several long, wordy documents can uncover many new words to include in the word list.

Although it contains many unique features, there are some things that Proof-Writer just does not do. For example, you cannot perform block moves on columns of text, and the formatter does not provide automatic handling of proportional spacing. In addition, since there can be only one Setup file on e disk, you must do some juggling if you use two printers. Nevertheless, the only real fault I find with the program is the leck of formatted copy onscreen in the editor. In eddition, the package requires 128K, and most people with s system that large probably have quite a bit more memory. If ProofWriter allowed it. they could use this extra memory to have both the editor and the formatter available simultaneously. Still, ProofWriter's limitations are outweighed by its unusual capabilities and reasonable list price. If special-character control is an important word processing feature to you, ProofWriter warrants consideration.

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CIRCLE 328 ON READER SERVICE CARD

HIStorn Recurrences. IBM Personal Computer with 8/07H color & reconnel screens - 255K Mercory - One disk drive.

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The BROTHER HR-1 Daisy Wheel Printer opened up a new market in low cost, high performance printers. BROTHER HR 1 asses letter quality printing for all your most demanding business requi

a noise level comparable to a whisper in a soft rain The HR-1 is now available with a tractor option which

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brother.

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CIRCLE 286 ON READER SERVICE CARD

A solid contender among the present generation of electronic spreadsheets, the Number Cruncher offers a report-oriented format, a sophisticated approach, and a polished end product.

The Number Cruncher

Number Cruncher Pyramid Data, Ltd. P.O. Box 10116 Santa Ana, CA 92711

(800) 521-2233 (714) 639-1527 in California (call

List Price: \$395, Loan Amortization Preparer Modula \$49.95, Invoice Preparation Module \$59.95

Requires: 128K, PC-DOS, two 320K disk drives, monochroma or color display, printer with 132-column capability and/or compressed printing feature. CIRCLE 696 ON READER SERVICE CARD

First there was VisiColc and then came the look-alikes. Next came the enhanced versions and the "new, improved features" in the second generation of electronic spreadsheets.

Now comes the Number Cruncher in a sophisticated format, designed from a fresh, unique perspective. It's certain to be a solid contender in the present generation of alactronic spreadsheets.

Accountants and bookkeepars like to refer to their calculations as "crunching numbers." That's exactly what the Number Cruncher does—and it does it with astounding speed in compiled Microsoft BASIC.

The Number Cruncher is truly a financial analysis and projection system that axpands the basic spreadsheet concept into a well-focused report-oriented tool that meets every business need from invoicing to budgeting and inventory conricult can be applied to payroll, tax planning, loan amortization, stock-portfolio planning, and much more.

The program is so flexible that it allows you to design and print reports, invoices, documents, and even check to your specifications. That means you can use the Number Cruncher program with all of your existing forms.

The best part of the Number Cruncher is that it is so easy to use. The keyboard control, math functions, cursor movement—and just about everything else—are amazingly easy to master. Word processing capability is integrated into all

aspects of the Number Cruncher, too.
The program takes full advantage of the
numeric keypad for entering numbers calculator-style, while allowing you to zip
the cursor around the screen through an
ingenious use of the first four function
keys. Other function keys enable you to
shift columns left or right, duplicate tel
tiems, signal the end of your work, and
access the Help screens or instructions.

The F10 key is used as a command key to control the Number Cruncher program functions. Commands to control the program are handled through the effortless use of the bracket charactar followed by one or more letters. When you press F10, the bracket is automatically printed on the screen for you at the cursor position. Then

Figure 1: This is the Run Menu, where the program's serial number and your name are embedded and displayed. Pressing F9 or the ? key will cause the Help screen explaining the Run Menu's selections to appear.

PVRAMTD'S NUMBER CRUNCHER

RUN MENU

- RUN MODEL
- PRINT MODEL
- PRINT MATH STEPS
- 4 PRINT LAYOUT SHEET
- RETURN TO MAIN MENU 6
 - CHANGE MODEL FORMAT
- REORGANIZE MODEL CHANGE PRINT SIZE
- FOR INSTRUCTIONS

SERIAL NUMBER 1804

Version 1.1 (C) 1983, an unpublished work by Pyramid Data, Ltd., Orange, CA. All Program Products proprietary of Pyramid Data, Ltd. Authorized use by license agreement only. Pyramid Data License (Not for Resale) issued to: SIL. ALVERNAZ - PC Magazine - Evaluation Copy - Pre-release

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18006		5000					
1MV	UP	2MV	DWN	3MV	LFT	4MV	RGT
5	6	7	ROONE		92	n í	

RUN MENU SELECTIONS

- RUN MODEL Use this to put in new math steps and compute your results. PRINT MODEL - Use this to print out your model on your
- printer
- PRINT MATH STEPS Use this to print out your math steps.
- PRINT LAYOUT SHEET Use this to print out your model showing the 'item numbers' or 'xx' s.
- RETURN TO MAIN MENU Use this to go back to Main Menu to 'Save' the model you are working on or to 'Load' a new model from a storage disk.
- CHANGE MODEL FORMAT Use this to change decimal alignment, size of number items, add new items, delete old ones.etc.
- REORGANIZE MODEL After you have all your math steps in and you are happy with the results you are getting, use this to speed up my operation.

DEPRESS (O FOR MAIN SELECTIONS OR - (F TO RETURN TO WHERE YOU WERE 1MV UP 2MV DWN 3MV LFT 4MV SDONE

all you need to do is type in the comm letter or letters you want.

A New Perspective

Pyramid Data is somewhat of a newcomer to the personal computers field, but it is an old-line company when you consider that it was founded in 1975. Until now, the company has concentrated on the mini-computer market. It's obvious that Pyramid Data has taken its experience and expertise from almost a decade of serving customer needs and wrapped it all up in the Number Cruncher package.

Pyramid Data's resources are conveniently only a toll-free call away, fn the course of evaluating this program I called its number collect three times and received help immediately. Two questions were contrived by me simply to test the service; they solved them nonetheless. The other problem I called about actually developed only because my mind kept telling me that the process of the Number Cruncher couldn't be as simple as it seemed-it turned out it really is.

Purchasing the System

fn a computer store, you've just tried out the Number Cruncher's color tutorial program and decided that this is the program for you. You now have two purchas-

 V_{IYMIND} kept telling me that the process of the Number Cruncher couldn't be as simple as it seemed-it turned out it really is.

ing options. The first option is to spend \$39.95 for a version of the complete Number Cruncher program that is limited to produce one-page reports. The "unlimited" Number Cruncher

program, which handles reports up to 10 pages, costs \$395. You do, however, receive a credit for your original \$39.95 expenditure if you return to your dealer to purchase the full program.

Pyramid Data makes an interesting statement through this unique marketing



ResO is quite simply the easiest-to-use, fastest and most comprehensive information management system ever developed for the IBM Personal Computer. It was designed from the ground up to provide you with the exact information you need . . . only the information you need . . . in the exact form you need it ... now!

Best of all, you don't have to know a thing about computers to take full advantage of ResQ almost immediately!

Like many other Data Base Managers, ResO organizes, files, locates, controls and interrelates just about any kind of information. It prepares reports and mailing labels, is a general filing and reference system, handles customer records and inventories, tracks sales leads and follow-ups, and does the required calculating for any of these functions automatically. But that's where the similarity to other systems stops!

ResO is the only system that allows you or a secretary to design your own forms and reports, create them right on the screen, then have them continuously available at the touch of a key! ResQ offers password protection to keep confidential information confidential, and does it on a number of

different levels. ResQ reads, searches and sorts data faster than the fastest competitor we've tested.

ResQ's larger fields hold more information, and field sizes can be easily changed to increase your number of salesmen, products, files or reports. It allows for calculations on up to 8 levels of totals at report time, and interfaces with



most popular word processing programs.

The ResO "How-To" Manual is written in plain, simple English-not like a scientific textbook in a foreign language! It was created for immediate use by clerical help who had never touched a computer before. It's been tested . . . and it works! As an added feature, "help screens" are always immediately available to answer questions for the user, without having to turn to the Manual

We believe you'll be absolutely thrilled with ResQ and the way it prepares reports, manages information and solves your business problems. We're so certain that we offer ResQ with a 30-day money-back guarantee of satisfaction. You can try ResO in your own business environment and prove its value for yourself...

completely without risk! That's a very remarkable offer . . .

but ResO is a very remarkable system! Order ResO through your local

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DEC Rainbow 100 in



Model #001 in Almond



Model #002 in Natural Oak

SECURITY: The Computant is the first computer workstation to provide security for both the hardware and software. Simply return the keyboard to the closed position, close the doors and roll down the double walled tumbour door and one key locks it all up.

ERGAVATICS: The level-out and the food distance to the display are adjustable to suit the individual needs of each user. The user sizply places the work directly behind the keyboard and in front of the display in the normal line of sight virtually eliminating, unnecessary reach and head neck movement. Even the pitch of the work is adjustable. With the Computant you need not compromise your comfort.

MOBILITY: Since the Computent is on four with wheel casies, you may move the complete/emind from place to jack to take advantage of the multi-tasking abilities of the hardware. With its compact size (requires 4 sq. fi. floorspace) the Computent fits into are vesting environment, allowing you to use the computer in places that you thought just didn't have the room. MORE INFORMATION'S Give us a call told fire at 800/237-9024

MORE INFORMATION: Give us a can on ree at 800 25, 50.0 or ask your computer or office furniture dealer to call for you. We have the only computer workstation that will keep it all securely together for you.

CIRCLE 199 ON READER SERVICE CARD

COMPU-CARI

approach. It says, first of all, "Here, try the program to see what you think, for a minimum cost. If you don't like it, then you're not out that much money." However, Pyramid is also saying that it has confidence that the Number Cruncher will more than meet your needs and that you will be happy with it.

F YOU

don't like it, then you're

not out that much

moneu.

There's one more aspect to this marketing approach which has to do with copy protection. The Number Cruncher is not copy-protected, et least not as we now know it. It is, however, protected in e rather interesting way against being copied and used by others besides the original purchaser.

When you purchese the full program you don't get it from the store. You pay the store \$395 for it, hut the program is then shipped to you from Pyramid's corporate headquarters in Santa Ana, California, via UPS Blue Label.

The program disk you receive has your mame embedded on it, along with serial number. The serial number and your name are displeyed quite often in the 'Run Menu' of the program. (See Figure 1.) This gives the product a nice person touch while making the purchaser more accountable for unauthorized sharing and copyring.

It's interesting to note that the Number Cruncher will not be evailable anywhere other than the computer stores now carrying Pyramid products.

Getting Started

Once you bring your Number Cruncher program home, you need to install PC-DOS on the working disks. The package's series of three disks—the Program A and Program B disks and a Storage disk—will run on all yersions of PC-DOS.

The routine for installing PC-DOS is a hit complex; it requires that you follow the instructions on the screen exactly as they are written. Once PC-DOS is installed the Number Cruncher is self-booting.

After the program is loaded in your PC, you first enter the date, which moves you

into the Main Menu (see Figure 2). The Number Cruncher is totally menu-

driven. The menus are ell so simple to use that the manual really isn't needed. The

Figure 2: The Number Cruncher's Moin Menu, showing options for Getting Storted and Normal Operation.

PYRAMID'S NUMBER CRUNCHER

MAIN MENU

GETTING STARTED

DEMO DO THIS FIRST IF YOU HAVE NOT RUN THE NUMBER CRUNCHER

BEFORE:

IG COMPUTER AIDED TRAINING ON NUMBER CRUNCHER OPERATIONS.

TRNG COMPUTER AIDED TRA

INST PRINTS A SHORT SET OF INSTRUCTIONS.

BOOKPRINTS A COMPLETE SET OF INSTRUCTIONS.

NORMAL OPERATION

NEW SET UP A NEW REPORT OR MODEL.

UN RUN AN EXISTING REPORT OR MODEL ON DRIVE 'A'

FRMT PREPARE BLANK (NEW) DISKS FOR USE ON THIS COMPUTER

COPY MAKE A BACKUP COPY OF A DRIVE 'A' OR DRIVE 'B' DISK.

SAVE SAVE THE MODEL ON DRIVE 'A' TO THE STORAGE DISK IN DRIVE 'B'
LOAD LOAD A MODEL FROM THE STORAGE DISK IN DRIVE 'B' TO DRIVE 'A'

DIR DISPLAY THE NAMES OF MODELS ON THE STORAGE DISK IN DRIVE 'B'
UTIL UTILITY ROUTINES - TEST DISKS. ETC.

UTILITY ROUTINES - TEST DISKS, ETC. DISPLAY INSTRUCTIONS.

TYPE YOUR SELECTION. AND DEPRESS RETURN.

Figure 3: It is from this New Menu that you create your warking madels of the Number Cruncher. You can also edit and print model formats from this menu.

PYRAMID'S NUMBER CRUNCHER

NEW MENU

1 CREATE A NEW MODEL FORMAT 2 EDIT AN EXISTING MODEL FORMAT

3 PRINT MODEL FORMAT

4 CONVERT MODEL FORMAT TO A RUNNING MODEL 5 RETURN TO MAIN MENU

6 CHANGE PRINT SIZE

? FOR INSTRUCTIONS

1MV UP 2MV DWN 3MV LFT 4MV RGT 5SH LFT 6SH RGT 7DUPLCT 8DONE 9? 0[

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All across the nation, PowerText has become the prime word processing system for professionals.

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PowerText origin the most complex do

Pormatung is twey automatic.

Deverlied prints the most complex documents—from business letters to dramatic scripts to legal documents packed with footnotes—proceey consistent with the formats you define. You need never worry about printed style as you write. Yet you always get perfectly formatted documents.

it's almost like dictating to your computer.

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lent to split-screen editing You get built-in form letter capability. Remarkably versatile columnar

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(Or you may wish to send for the tutonal and manual. The cost is \$25. Please indicate which computer you have.) FOR IBM PC: \$399 FOR APPLE II OR IIa: \$299 FOR IBM PC, APPLE II OR III, WITH PASCAL: \$199



Pleasant Ridge Rd., Harrison, NY 10528 (914) 967-3504 CIRCLE 144 ON READER SERVICE CARD menuel becomes even more secondery when you consider the severel Help screens or instructions eveileble by pressing e single key. The instructions carefully guide you through whetever section

SAY GOODBYE to the old days of cutting and pasting printouts of those VisiCalc sureadsheets.

you're working in.

The thoroughness of the Mein Menu is just one exemple of the homework done by Pyremid Data in creating this progrem. From the Mein Menu you can formet end copy disks—all without leaving the program. The Mein Menu also offers demonstretion end treining programs, both of which effectively show you how to use the which effectively show you how to use the

program.

The "Getting Started" section of the Mein Menu also gives you options to print a short set of instructions or a condensed

manuel to use as references.

The heart of whet you will be doing with the Number Cruncher is under the "Normal Operation" section of the Main Menu. It is from here thet you will set up your reports, or "models" as the menuel

refers to them. After the model is set up, you then run it to perform specific tasks like invoicing, making reports, budgeting, or trecking inventory control.

Creating a Model Format

After going through the Demonstration and Training programs from the Main Menu, you would be ready to create your first model. Choosing "New" from the Normel Operations Section of the Mein Menu will bring you to the New Menu. (See Figure 3,) To start creating your new model formst you enter "1." This moves you right into the "New Screen" of the Number Cruncher.

Figure 4 shows e New Screen with some data already entered in 132-character formet. You have your choice of the 80-0132-character format there is e split screen, allowing you a complete view of each page of your program et ell times. This takes a little getting used to for those who currently work with the other spreadsheet programs.]

The Number Cruncher does not go beyond 132 characters because its format is entirely report-oriented. That means you must think in terms of reports at every stage of the process of designing your reports or models.

The progrem forces you to constantly think in terms of your finel product. So, say goodbye to the old days of cutting and pasting printouts of those VisiCale spreadsheets that then hed to be reduced

got in your model. You set u	p your working n	nodel through t	his scree	n.	
PAGE 1 LINE 1 PGS 1					
1020	3040	BUDGET	ANALYSI BIL.	S PREP ALVERN XX/XX	ARED I
	P11	. ALVERNAZ	DIAM	A ALVE	PMAZ
HONTHLY INCOME					
INTEREST & DIVIDENDS	90	XX,XXX.XX XX,XXX.XX	110	XX, XX	x.xx x.xx
	COMBINED	Ans	NUAL		
	XX. XXX. XX	XX.	m.n		
	XX.XXX.XX	XX.	XXX.XX		

on the copier to fit on an 8½ by 11 sheet. The Number Cruncher is designed to keep you thinking from a report-oriented perspective with a polished, professional end product in mind.

Working with Xs and zeros

A unique aspect of the Number Cruncher is apparent when you begin to set up your model format. (See Figure 5.) There are no row and column numbers to deal with in setting up your number areas. You simply type in your text: then, wher-

ever you want figures, you type in Xs.
It is through typing in Xs that you set
up "cells" for the Number Cruncher to
work with. These cells are then partially
converted to zeros (see Figure 6) for the

converted to zeros (see Figure 6) for the working model in which you will enter all of your information.

As you set up your model you will type in dollar signs. commas, periods, slashes, or dashes along with the Xs that locate unmbers. This allows you the loxery of which we have a sign of the locate of the loxery of which we have a sign of the locate of the

Typing in your information is truly effortless through the Number Cruncher's

THE CURSOR movement becomes lightning fast because of an artful programming technique

word processing feature. To move the cursor horizontally and vertically around the screen you use the function keys, F1 through F4 (F1, up; F2, down; F3, left; F4, right).

The cursor movement becomes lightning fast because of an artful programming technique. If you type in a number and then press one of the four function keys,

MAJOR LEAGUE BASEBALL ON YOUR PERSONAL COMPUTER

Now you can simulate Major League Baseball games on your IBM P.C.

Home Computer Major League Baseball allows you to play Major League Baseball games between any of the teams from the past season (1982), or any of 16 famous Old Timer's Teams.

All batters and pitchers are rated according to the major statistical categories, so their "performance" in the computer games will be similar to the performance for the appropriate season.

Like any good simulated baseball game, Home Computer Major League Baseball contains all of the important baseball strategy options stolen base, sacrifice bunt, defensive changes, hit and run, infield in, etc. However, Home Computer Major League Baseball contains much, much more—for instance:

-Ability to play against the computer

—Ability to play multiple (e.g. 20, 50 or more) games with the same lineups, with only the final score being printed. These games take less than two minutes each. You can use this option to test various lineup combinations.

—Ability to make trades, create new teams, hold a "free agent draft"

—in addition to printing a box score, the program will update league standings and statistics; you can access the statistics, and print out "League Leaders" for the various statistical categories.

This package is more than just another computer game. It is a complete set of programs which allow you to simulate Major League Baseball in your own home/office. Games, statistics, trades, and more.

—All programs are user-friendly and prompt-driven; you can learn the instructions in a matter of minutes. Games will take 15-35 minutes. —Music; color supported, not required.

Here is a box score of a Home Computer Major League Baseball Game

1962	Ma.	,					_	-	4	٠	
-	-		47			-	-	-	-	-	
1041	•										
51.000m				:	:		- 2	:	1	:	
			- 1			- 1			•		
										•	
			- 5								
Span 1979s	30										
100		1676	***		-	-					
	6.2			,	-						
Nor No.	8.0	18	-	-	7						
1483	-		- since	••		-		٠,	•	*	-
104	-	**	+070	20	200	-	-		-		
4400	÷	- 5	- 5	:	:						
							- 3				
DEPTH.	•	- 1		1	:		- 1	٠	:		
GENTS.	- 1	- 1	- 1	÷	i	:	- 1	:	:	÷	
GENTELL DECK	i	÷	i	ŧ	i	ŧ	1	ŧ	÷	ŧ	
DETAILS DETAILS DETAILS PERSONS DETAILS		į	i	i	i	:	:	i	į	į	
BOTH I		÷	!	:	:	;	1	ŧ	÷	į	
BUTTON STAN		į	i	i	i	:	:	i	į	į	
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DOTAL BENTAL MICH PAPER PERSON NAME TO ALL MATERIAL	422	:	-	:	:	:	:	:	;	į	
DOMESTICAL	42	:		:	-			:		į	
DOTAL DECRETAL PROPER PERSON TOP TOTAL TOP TOTAL TOP TO TOP BUTTON TOP	42	:	-	:				:		į	

Technical specs: IBM P.C., 64K (160K version now available) minimum, at least one 320K disk drive DOS, BASIC required. Printer supported, not required.

IBM PC is a trademark of IBM Corporation

To order Home Computer Major League Baseball, send a check for \$34.95. Or send for free information to

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CIRCLE 330 ON READER SERVICE CARD

the cursor will then be moved that number of lines or columns on the screen.

If you are in column 5, enter 55, and then press F4, you are zipped to column 60 instantly. The same process is used for going up and down in rows. This feature is handy for entering information as well as editing it.

Another convenient feature of the Number Cruncher allows you to move to any page of your report or document by typing the command (P followed by the page number, which quickly transports you to the page indicated. When you consider that you can have a report of up to 10 pages, being able to move from page to page this wey is e welcome facility.

Item Numbers and Math Steps Before you enter the numbers in your

model, you have a few more steps to complete. These might seem like unnecessary

steps to those who are used to working with the current spreadsheets, hut remember that the Number Cruncher uses a totally different epproach. Actually, these extra steps are design features that make using the program more convenient.

The first of these steps is printing a "Layout Sheet." This is the point where the real differences of the Number Cruncher come into play. From the Run Menu (see Figure 7) you select Option 4. causing a Layout Sheet to be printed.

Now the zeros have been replaced by item numbers (see Figure 7). When you went to plug in a figure at e specific location, you just use the item number. No more row and column number confusion as in spreadsheets with reference cells

such as "AR103" Each item in the Nu ber Cruncher model is numbered.

A 10-page report is limited to 3,400 items. With e hard disk there are no limi-

HE NUMBER Cruncher uses a totally different approach.

tations, except for the 10-page format. The next step is to work with the model where each value is identified by an item number (see Figure 7). If you want to work out the monthly wages for Bil. Alvernez, then you work with item number 18. The date in our working model here is item number 6. These same item numbers are then used when you enter your math for-

mulas. Before you can complete your working model and enter the Meth Steps, you need to make a determination as to how each item will be handled. You have four choices: 1. A Data Entry Point: 2. A Constant Number: 3. A Computed Number: 4.

A Math Step Point. A Data Entry Point is any numeric or description field or "cell" that is subject to frequent change. In our working model the date (item number 6) is a Data Entry Point. This would be changed each time the

model is nin.

A Constant Number is one that will never change, Item number 189 (months in year) is an example of a Constant Number. When you set up the model, you would simply type in this number and proceed to the next point.

A Computed Number is the result of a Math Step. A Meth Step Point, ohviously, is a location where you actually enter the steps of a math formula that will perform the needed calculations.

Let's look at an example of how easy the Math Steps are. The Meth Step for item number 21 (the Combined Wages figure in our working model) is as follows: ADD WAGES 1 (0018) TO WAGES 2

(0019) GIVING WAGES 3 (0020)

The Math Step starts out with a function. In this case it is "ADD." It then lists the column number (1) and the item num-

Figure 5: This is what the final model format looks like. The Xs set up the "cells" for the numbers you will enter.

	RUSET AN			
	BIL, ALVERNAZ	DIAMA ALVERMAZ	COMPENSED	ANNUAL
MONTHLY INCOME				
WASES	11,111.11	n,m.n	11,111,11	11,111.11
INTEREST & DIVIDENDS	n,m.n	11,111.11	11,111,11	11,111,11
	**********			********
TOTAL MONTHLY INCOME	11,111.11	n,m.n	11,111.11	n,m.n
LESS TATES	11,111.11	11,111.11	11,111.11	11,111.11
NET HONTHLY INCOME	11,111.11	11,111.11	n,m.n	11,111,11
	*********	шини	*********	*********

Figure 6: The Xs that oppeared in Figure 5 are converted to zeros in the working model.

FR. 1 H	IS. BIL. ALVERNAT		
BIL. ALVERNAZ	DIAMA ALVERNAZ	COMBINED	ANGEL
.00	.00	.00	.00
.00	.00	.08	.00
.00	.00	.00	.00
.60	.00	-00	.00
.00	.00	.00	.00
	98. 5 M 85 851. ALVERNAZ .00 .00 .00	1007 J. 100 J. 100 J. 110 J. 1	10. 1 MS. 10. 4 (1994) 11. 1 4 (1994) 11. 1 4 (1994) 11. 1 4 (1994) 11. 1 10

ber (9018). It then gives the same information for the other figure in the addition. The formula is then completed with "GIV-ING." the name of the item, the column number, and item number. "GIVING" means that the total of the two columns (WAGES 1 and WAGES 2) are just added toesther.

To enter this Math Step all you had to do was type in "A," which caused the word "ADD" to appear on the screen. You then typed in your first term number—"18." The screen then responded with "WAGES 1 (1001) TO. "You typed "18." at which point the screen displayed "WAGES 2 (1001) GUTING." Tyying the number "20" then caused the program to unickly display "WAGES 3 (1002)."

The working model in Figure 8 has 43 Math Steps in it. With a hard disk there are no restrictions on the number of Math Steps. However, with a 320K diskette, you

are limited to 720 Math Steps.

The Math Steps can be as complex as you wish, matching the capabilities of other programs. You just have to remember that things are done differently with the Number Cruncher.

Running and Using the Model Having marked all of the item numbers

as Data Entry Points. Constant Numbers, Computed Numbers, or Math Step Points, you are now ready to actually use your model.

THE CURSOR starts at the top and works its way to the bottom of the form or report.

From this point on, unless you need to change or modify your model, it will be your working model for entering the information and data you want calculated and processed. The best example of how a model works over and over again for you is an invoice. You set it up just once, the way you want it, then you run it day in and day out in your business.

Figure 8 shows the completed hudget

analysis that we've been working on. The numbers were all entered in rapid succession as the program automatically zipped from one item number to the next. All calculations were instantaneously displayed on the screen. As you enter data, the cursor starts at the top and works its way to the bottom of the form or report—and it does this very quickly. One awkward aspect of the Number Cruncher is that the cursor will stop at item numbers that have already been cal-

Figure 7: The Number Cruncher uses a unique system of "item numbers" to mark the "ceils" (spaces reserved for dota entry and/or calculations). The zeros on the loyout sheet in Figure 6 hove been replaced with item numbers.

		Mt. 8 HRS	F 6		
		DIL. ALVERNAZ	DIAMA ALVERNAZ	COMBINED	AMERICA
MONTHLY INCOME					
MAGES		18	19	20	
INTEREST & BIVIDEN	15	25	24	27	
TOTAL MONTHLY INCOME		38	39	40	
LESS TAKES		15	44	47	
NET MONTHLY ENCORE		22	53	54	
			OUTBAY EIPOISES		
	MONTH - 1	MONTH - 2	MONTH - 3	S-MONTH TOTAL	WERNE
	M0418 - 1	100000000	10000000	3-MONIN IDIAL	##E/MAGE
MORTEAGE	80	81	82	83	
WILLITES	87			**	*
THEMPHICE	**	15	94	97	
NOVSENDLI+	101	102	103	104	100
LOAKS	108	189	110	111	112
CREDIT CARDS	115	116	117	118	11
MITO EXPENSES	122	123	124	125	121
HEDICAL	129	130	131	137	12
CONTRIBUTIONS	136	137	130	139	140
TOTAL MONTHLY EXPENSES	150	151	152	153	154
	HET HONTHLY INCOME		57 158 PCT.		
	NONTRLY EXPENSES	10	143 PCT.		
TOTAL AVAILABLE FOR IM	VESTMENT		71 172 PCT.		
CURNICAT SAVINGS	174	177 KI.			
	181				
	184	185 PCT.			
HOME WALLE CHREET HORTONIE					
HOME WILLE	189				

culated. At these points you need to tap the Enter key to move to the next item number

An example of how quickly data entry is accomplished can be illustrated by the Mortgage line of the Budget Analysis in Figure 9. Item numbers 80 thru 82 represent the amounts to be paid in "Month-1,"

HOWTHLY THEORY

TOTAL MONTHLY INCOME

TOTAL MONTHLY EXPENSES

TRTS

"Month-2," and "Month-3." The "3-Month Total" (item number 83) and the "Average" (item number 84) are marked for calculations to be performed. As soon as you enter item number 82, the "3-Month Total" and the "Average" figures appear on the screen. Complex mathematical operations in the Math Steps tend to

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slow down the calculations, which is true with all spreadsheet programs.

Now that you've entered all of your information, you're ready to print your model. Printing is accessed from the Run Menu (see Figure 1) by pressing 2 to select "Print Model."

One weakness, which is inconsistent with the Number Cruncher's sophisticated program design, shows up when printing the model. There is no way to interrupt the print cycle other than turning off your printer. This can be a real problem if you start to print your model and then realize that you didn't set the printer to be in the compressed mode. Unless you figure out that turning off your printer is the only way to stop it, you will just sit there belplessly looking at the Run Menu while your printer does strange things.

To get out of this you must turn off your printer. Then you will get a "Device Time Out Error" message, at which point you can restart the program and reset your printer for the compressed mode.

Modules for Convenience

For people who like the Number Cruncher's process but don't want to bother with the Math Steps and formulas, Pvramid Data has the answer in the form of program "Modules."

A Module is a program already written for you, which you can load onto your Number Cruncher disk. It's not really a template; it's an actual running model that uses the features of the Number Cruncher in the same way as any models you might

HE MODULE saves you the trouble of having to set everything uv.

have set up under the complete program. The Module just saves you the trouble of having to set everything up.

The Modules are designed to allow you to modify or even change them. However, the Modules are so well thought out that most people will probably be content to use them as they are.

Figure 8: Final printout of budget analysis produced by the Number Cruncher.

	MR. 6 MRS.	BIL. REVERNAZ BIL. REVERNAZ
	No or	6110103
B1L.	AL VERNAZ	BEANN PLYERNAS

3,450,00

7 400 51

LESS TAXES		855.00	855.00	1,710.00	20,520.00
ET MONTHLY INCOME		2,843.50	2,843.50	3,687.00	68,244.00
			DATHLY EXPENSES		
	MONTH - 1	HONTH - 2	MONTH - 3	3-MONTH TOTAL	AVERAGE
	********	*********	*******	***********	*******
MORTBAGE	1,450.00	1,450,00	1,450,00	4,350,00	1,450.00
STILITIES	175.28	273,58	255.90	704.58	234.86
INSURANCE	198,00	725,00	249.00	1,161,00	387,10
HOUSEHOLD+	1.319.00	1,330.00	1,318.00	3,930.00	1,310.00
LOANS	785.28	565,30	545.30	1,915.00	438.40
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AUTO EXPENSES	129.50	465,00	221.88	815.38	271.79
MEDICAL.	125.00	77.18	335.96	538.04	179.35
CONTRIBUTIONS	100,00	260.00	195.00	545.00	181.67
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3,650.00 7,300.00

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The price of the Modules is reasonable. especially when you consider what the time you would have spent creating their equivalents would be worth. The Loan Amortization Preparer Module costs \$49.95; the Invoice Preparation Module costs \$59.95.

LHE NUMBER Cruncher offers small businesses a complete package that is priced right.

Other modules in the works will cost up to \$89.95 and address areas such as Tax Planning, Inventory Control, Stock Portfolio Planning, and Payroll. The Payroll Module will be able to handle data for up to 50 employees. It prints 941s, W2s, a check register, and performs all accounting functions. Checks can be printed in batches or one at a time as needed.

A Complete Package

The Number Cruncher, along with its Module options, offers small businesses a complete package that is priced right. Besides heing an easy-to-learn program. Pyramid has built in the Module options for those who want the ready-to-run packages. This approach helps keep the basic Number Cruncher program's price down for those who choose not to buy the Modnles

Pyramid Data, Ltd. thought of just about everything, even down to a manual that can be propped up on the desk in front of you while you use the program. The package even includes a cardboard function key overlay that identifies how to use the function keys.

When the showdown is over for the second generation of spreadsheets, the current programs such as 1-2-3, MultiPlon and VisiColc will still be known as "top guns." But as the sun sets, a program such as the Number Cruncher will be much. much more than just a smoking pistol. It will have had impact, created changes, and started a new trend in program design.

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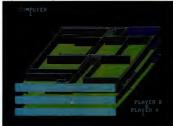
There's not an awful lot to Super Novotron, but the game itself is remarkably quick, unusually attractive, and designed with great care. It also talks back to you, a feeture that will delight or dismay you, depending on whether you or the computer win most of the rounds.

The object is to build walls to trap your opponent (the computer) and force it to crash into a blockade before you do. The computer, of course, has a mind of its own, and sets out to make your efforts futile. Very simple-and very difficult to sustain. The geme builds one laver of the board on top of the previous layer in the screen images that catch your eye and your interest.

The game can be played from the keyboard, using predefined commands of the Ins key for left and the Del key for right. Function key F10 speeds up the game, F9 slows it down, and Esc terminates it. All thet seid, I found it rather difficult to play the game from the keyboard, preferring Requires: 64K RAM, DOS 1.1, color/ instead to use a joystick. (The skimpy instruction card for Super Novotron does not even mention that joysticks can be used. You have to boot up the program to discover this feature.)

You are given a choice of joysticks or keyboard, sound or silence, and one of three levels of difficulty. Level 1 wes tricky; Level 3, all but impossible, at least to the neophyte. The program includes an installetion program to copy system tracks and COMMAND.COM onto the program disk to allow for an AUTOEXEC batch file. However, Super Novotron was unable to bendle the presence of both a monochrome and color/graphics card on my office PC-XT end hung up. The machine had to be instructed manually to switch to the color board. I was unable to crash the progrem once it was underwey.

At the end of each round-and rounds can be very short when you're learningthe program generates a tinny little voice thet ennounces, "The com-put-awr wins round one" or some such line. Be eware



loshup did better of the Bottle of Jericho thon you will with Novation, whose computererected walls don't come tumbling down eosily.

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that there is also a product from VeriSoft called NovoTron Trilogy, which seems to bear a tangential relation to this offering but is not the same game.

The only real reservation about this game involves its longterm interest. As one of the office staff put it, "It doesn't have much of a plot." But until you get bored, Super Novotron is e flashy partner. On the PC Mogozine rating scales of one to six [six being highest]. Super Novotron ratiness are average:

FUN: 3.5 CHALLENGE: 3.5 GRAPHICS/SOUND: 4.0 TOTAL: 11.0

This game is a mouse of a different color.
Mouskattock is a maze game that casts you as "Larry Bain, ace plumber, of Rodent

Rooter plumbing service." You must lay plop while scurrying through all the twists and turns of the maze. At the same time, you have to avoid treacherous roaming rats. You have ealles. You can pick up and deposit cats, trups, and other devices to fight off the wermin, but the giant rodents persevere. If you manage to lay all of your pipe without being eaten, you move on to another level of the maze.

Yes, folks, yet another permutation of PacMan, even with the variation of laving

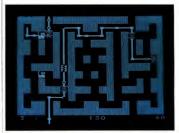
plpe Instead of gobbling dots. The game is reasonably well done in terms of graphics and sound, including a nice rendition of Robert Schumann's The Wild Horsemon but it uses only the keyboard and not a joystick, and the response time is some-

times slow.

But perhaps the most surprising effect is this: Beapite the full-color picture of a plumber on the cover of the box, and despite the two-color picture of a maze on the back of the box, on an IBM RGB color monitor this game is displayed in glorious black-and-white This does not evertising. According to Sherro Ardonius Oseron Color and the color of the col

You are able to define your own keys for movement and for picking up objects. The game can be suspended in midplay, and you can skip over the long bit of Schumann and get right into the chase.

On our rating scale from one to six, Mouskottock earns a mousy score:



You are, believe it or not, a plumber loying pipe in Mouskattack, besieged by ravenous rats. The display on an RGB manitor, alos, is dull monochrome.

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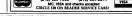
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4147 Beethoven Street Los Angeles, CA 90066 (213) 306-7412 Questions about aligning disk drives, connecting a PC and Displayuriter, writing a word processor, and programming a ROM are answered this month by the PC Tutor.

PC Tutor

Aligning Drives

Q: In the article "Avoiding the Wars" (FC, Volume 1, Number 1), the suggestion is made to "...consider checking drive unable to find any reference in any menual. Including the Hordwore Mointenance and Service manual, to checking drive aligament. I would like to know exactly how this is done.

> Michael F. Costa Totawa, New Jersey

A: Drive alignment can be best checked by a qualified service person. If you insist an daing it yourself, then you will need the fallowing equipment: a medium frequency ascillascape (10 Mhz. preferably with a Z-axis input), an alignment diskette, and the technical manual for your drives.

The alignment diskette is a custam part that you may need to arder from the drive's manufacturer. I know that Dysan sells these diskettes; Shugart and Tandan also should know where to obtain them.

The alignment procedure consists of ottoching the oscillascape to a test point



and inserting the olignment diskette. The head is then maved to various parts of the disk and the analog read signal is compared with the desired result. This checks speed and alignment.

If you would like o mare inexpensive approach (alignment diskettes cost about \$40 and one uncapyable), there is another test that is nearly as good for narmal purpases. To check track seeking, just borrow prewritten disks from your friends and make sure you can DISKOOPY all of them. This is a foirly good way to ensure that

yaur track alignment is adequate.

Ta check speed, you can borrow an
approach from audia turntoble makers.

One note: the Cromemca Z-series computers often use Tandan drives, and Cromemco includes the drives' technical manual in its literature for dealers. You might wish ta check with o Cramemca dealer if you are intent an perfarming an alignment yourself.

They use a cardboard cutaut with lines

drawn on it. When the maying cutout is

viewed under fluorescent light (which

flickers at 60hz in the United States), the

lines should oppear to stand still. I have

seen such cutauts far 8-inch disk drives,

and assume similar cutauts are available

far the PC's 5-inch drives. Again, this is

just a raugh test; you should still occa-

signally have the drive checked out by a

competent technician. Under na circum-

stances shauld you ottempt to align the

drives yourself without first purchasing

the technical manual far the drives.

Talking to Displaywriter

Q: I aperate an IBM Displaywriter at work and an IBM PC at home. Both work well, but I am sure I could accomplish more if I could make the two machines "talk" to

PC MAGAZINE 581 AUGUST 1983

Can you tell the IBM from the Transtar 130?

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menterior

One of these two print samples was generated by an IBM Selectric II: the letter quelity stendard of the industry. The other was generated by the new Trenstar 130 letterquality printer.

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each other, or share software. Any suggestions would be greatly appreciated.

Petricie A. Cronk Medrid, Iowa

A: I om not ot oil fomilior with the IBM Disploywriter, but I con suggest methods oppropriote to most smoll computers. Usually, when one would like to transport o file between machines, the simplest

port o file between mochines, the simplest opprooch is to tock two seriol ports together. If your IBM PC has an osynchronous communications adopter, and the Displaywriter does as well, then you should be able to transfer files back and forth.

This opproach usually requires that you have a person attending to each machine. One person uses o PC madem program to send the file while the other person uses of Disploywriter amodem program to receive the file, or vice verso. Most modem programs ovailable for the PC will easily occumplish the tosk, but I om not sure about Disploywriter software.

sure obout Disploywriter softwore. If you would like to hove the PC unottended, then when using PC-DOS 2.0, you just need to type MODE COM1300 and then CITY COM1 (ossuming you wish to run at 300 boud, even pority). This will put the PC into a remote configuration, so that the Disploywriter can diad up your home computer. This requires a modern with auto answer copobility; set the modent to auto answer first.

A for simpler (but more expensive) method would be to use the some operating system and drive size on both computers. The PC on centily support 8-inch drives, such as or use of on the Disployment of the policy of

Another reoder [S. McMullon of Soskaton, Soskotchewn) osked the some question. He seemed to feel that on ASCII to EBCDIC conversion was required, implying that the stock Displaywriter speaks EBCDIC. This would make motters more complicated than could be solved by just connecting serial parts. The only two PC modern programs that can speak EBCDIC (which I know of] are Ascom and Inter-Lunc, Both programs have or tonslobe

toble copability.

EBCDIC is much like ASCII, but with o different correspondence. For example, chorocter 64 is an EBCDIC spoce, while 32 is an ASCII spoce. The book Microprocessor Interfecing Techniques by Rodney Zoks ond Austin Lesea (§YBEX) hos on EBCDIC toble on page 358,

Cleaning the Buffer

Q: Could you explain how to clear the type ahead buffer in BASIC? I have a program in which I want to be sure there are no characters in the buffer before I issue the prompt. The manual indicates that poking e zero into address 106 will clear the buffor, but that doesn't seem to work.

Ken Hudson Winnipeg, Menitoba, Canada

To TRANSPORT a file between machines, the simplest approach is to tack two serial ports together.

A: As you soy, I could not get POKE 106.0 to do onything constructive. According to the monuol this is where the progrom editor works on characters received from the keyboard. However, the PC-DOS 2.0 BA. SIC manual olso stotes on page 1-7 thot you con cleor the DOS keyboard buffer vio this program line.

100 DEF SEG = 0 : POKE 1050, (PEEK

Giving ROMs Character Q: I am writing in response to your col-

umn in PC, Volume 1 Number 11. John P. Boyd wrote in asking about a dedicated scientific/engineering word processor for the PC. You suggested a solution that requires

purchesing e new ROM for the PC, and indicated that a programmed ROM could be had for about \$40. Can you suggest a program or person capable of programming my ROM and specifying a new character set I have in mind?

Larry Baca | BC MAGAZINE 563 AUGUST 1983

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CIRCLE 419 ON READER SERVICE CARD

A: Something went owry with the answer In that issue (things sometimes come back to hount mel. The correct onswer was: o ROM will cost obout \$40 exclusive of programming. Some dealers will program the ROM for a small additional cost.

If you would like to program the ROM yourself, then consider buying an EPROM programmer cord for the PC. The best such cord I know of is the Apparat Prom Bloster, which sells for obout \$129 (Ap-... 4401 S. Tomoroc Porkwoy. O 802571. This cord seems to be made, and its software and docon ore better thon most. It will olmost oll 24-pin EPROMs, Inhe Motorolo MC68764, which is used on IBM disploy adopters. creating the charocter fonts, I

such in the past. It is o thonktiring job, which can do omozing things to your eyesight. One woy to get o leg up on the pracess is by looking of the details of the current font used by IBM. This is easy to do.

To exomine IBM's font, just borrow on extra disploy odopter from o friend ond remove the ROM chip. It is the only chip on the cord that can be pulled out-make sure you know the correct orientotion well enough to put it back safely. The chip is oriented occording to o little indentation, either on the upper left corner or in the center of the top side.

Once you pull the chip out, it con be inserted right onto the PC's system boord. Just check the plocement of the other ROMs to get the orientation right. And, obove oll, moke certoin the power is off. The ROM will then be readoble just like the rest of the BOMs on the system board. such os the BIOS. You can use DEBUG to examine the ROM's locations and even sove them to disk. As I recoll, the ROM will reside ot oddresses F000:4000 through F000:5FFF. The ROM contoins four character sets: two color sets and two monochrame sets. The two color sets (8 × 8) ore located in the top 4K and the two monochrome sets (9 × 14) ore in the lower 4K of the ROM.

Stringing Commas

O: I have a lew questions. First, is there any way in Advanced BASIC to input a string containing commas? Next, how can I change the state of the CansLock key

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from within BASIC? Finally, is there an easy way to have a single command copy some files over to my RAMdisk and then execute a BASIC program?

loe M. Morrison Earle, Arkansas

A: I'll onswer your questions in order. First, to input o string that contains commas, there are three standard approaches. The simplest approach is to use an INPUT statement with mare than one variable. Thus: INPUT A\$,B\$. This will then require that the user enter exactly one commo. Using INPUT like that is good for osking the person for a CITY, STATE.

If you wish to accept input that may or moy not include a comma, there are two approaches. The simplest approach is to write a program like the one in Figure 1.

Note that this simple example ignares bockspace and escape keys, other than to display them and include them in the string. You can easily change line 120, so that the backspace and escape keys do a character/line delete respectively.

The final way to do string input with possible commas is by doing a machine language PC-DOS call.

In answer to your second question. about altering the CopsLock key volue, refer to my earlier column, where the technique was discussed (in PC, Volume 1 Number 11).

For the final question, what you are suggesting can be done using a PC-DOS BATCH command. The simplest way to create a Batch file is by using PC-DOS, as in this example:

A>COPY CON: TEST.BAT COPY BASICA . COM C: BASICA

A>TEST

Ctrl-Z

The important thing here is that the file shauld have the suffix BAT, which tells PC-DOS that the file contains commands for the operating system. The first five lines create a file named TEST.BAT containing some command lines that will be run as if you had typed them in. If you try running the TEST program (see the sixth line), it will copy BASICA to the C drive, then move to the C drive and run RASICA.

You can easily make mare camplicated Batch command files, especially with PC-DOS version 2.0, which has far more extensive Botch copabilities. Read the PC-DOS monuol for more details concerning Batch pragrams.

Dangerous Driving

Q: I am confused about whether or not I can drive my IBM monochrome display using the IBM color graphics adapter. The salespeople at the local store say "No!", while on the other hand we have seen an ad for the COLMON adapter box which purports to do what we want. Who is correct? Is it possible to drive the monochrome display via the color adapter with no risk of damaging the hardware?

> Robert L. Feldman Ithaca, New York

A: I have received (and answered) this question previously. For the sake of your display, let me briefly reiterate: DO NOT CONNECT THE COLOR ADAPTER TO THE MONOCHROME DISPLAY!

Although softwore can be written that will allow this to be done with no damage, it is in no way a proper function for on "adapter box"; unless you are very careful ta run the softwore immediately, domoge is inevitable. Even with the right software. the end results will be poor. Somehow, it seems better to spend the money on a good black and white display (which can be

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Figure 1: BASIC program ollowing strings with commos as input.

100 IS - " "

105 REM Now wait for user to type a key 110 AS = INKEYS : IF AS = " " THEN 110

115 REM If carriage return, string is done 120 PRINT AS : IF AS = CHR\$ (13) THEN 140

125 REM Else add new char to string, continue

130 IS = IS + AS : GOTO 110 140 REM Now IS is the user's input string



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Turning On

Q: This may be a silly question, but what is the best way to turn the PC on? We have several PCs, each with external hard disks, color monitors, modems, and printers. On each PC the peripheral equipment is plugged into a surge protector, which is connected to a multi-socket extension that has a circuit breaker.

Wayne Socha Monrovia, California

A: This is by no meons o silly question. In foct, the answer is sometimes debated by supposed outhorities. I olso hove o bios on this topic. In my opinion, the best method for turning on o system is to stort with everything turned off, and then to turn things on in order of whot they ore plugged into. Thus, turn on the multisocket extension, then the PC, then the peripherals.

Another good question is how to turn things off. You should turn switches off in opposite order: first the peripherals, then the PC. For most of this equipment, it will not really motter what the order is. The exception to the rule is the hord disk. It is usually best to have a stable signal availoble to ony disk controller before the drive is powered up, otherwise transients con ruin information. So moke sure that the PC is on before powering up your hord disk, and do not turn off the PC while the hord disk is still running.

With some disploys it is best to moke sure that the color monitors first have the correct sync signols to generate the right high voltage levels. Therefore, turning the color monitor on ofter the PC, and off before the PC, mokes sense.

If you ore really worried obout surges, it mov moke sense to follow the opposite rule when powering the printer on ond off. Power it on before the PC and turn it off ofter the PC. The printer's motor mov couse o large surge of power when you turn it on or off. This is porticularly noticeoble with big line printers, but not so much with present microcomputer printers.

I know that IBM insists that you con sofely power up the PC with floppy disks still in the drives. That may be so, but I hove had plenty of diskettes ruined in on earlier (though non-IBM) system by leoving them in when I powered the system down or up. I suggest you remove diskettes before power down, ot least.

Which UNIX Is Which? O: I read with considerable interest Hanno

Hinsch's article on various C lenguage compilers in PC, Volume 1 Number 10. Although the article contained a great deal of information, I em still confused about what differences exist, if any, between running a full C language on PC-DOS as opposed to UNIX.

Also, could you please briefly contrast Microsoft's XENIX with UNIX. Is MS-DOS 2.0 a functional subset of XENIX? Does XENIX contain a full C compiler? Why is XENIX only listed for the 8086—isn't the 8086 fully compatible with the 8086 One last question. Once a program has

been compiled, is that module compatible with ell computers utilizing the same CPU, regardless of the operating system that may be in use?

Joe C. Moody, Jr. Corpus Christi, Texas

A: C longuage compilers are often colled "UNIX C" compatible. That usually just means that the compiler contains all of the features specified in the book The C Programming Language by Brian Kernishan and Dennis Ritchie.

The only C compiler I know of that octubly contains UNIX-like operating system colls is Whitesmith's C. This is not a particular advantage unless you are very concerned about compatibility of source code. Modifying foreign source code to new operating system is usually triviol, no motter what the operating systems ore.

One C compiler seems like the best thing oround for the IBM PC: the Lattice C

EBCDIC IS
much like ASCII, but
with a different
correspondence.

compiler. (See "Is Lifeboat King Of The C's?" in PC, Volume 2 Number 12.) I con not tolk about XENIX very much. never hoving used it myself (soy, is there onyone ot Micrasoft with o spare copy listening?), but it purports to be extendily identical to UNIX, with the oddition of some real-time feotures and some filelocking feotures.

UNIX is on owful system if you have to work using reol-time routines because of its swopping olgarithms, which are more or less hard coded. Similarly, UNIX has no file locking, which would be necessary for multi-tosking occess to a file, because the designers cloimed that no motter how

UNIX IS AN awful system if you have to work using realtime routines.

much locking was included it would never be enough. That is theoretically true, but a well designed file locking system will work if the software is also well designed.

Most UNIX work-allies include o Compiler, I ossume that XBNIX is no exception. The reason for this consistency is that UNIX is itself written of most entirely in the C longuage—os is XBNIX, no doubt. Since the operating system equires of compiler, one is susually included with the pockage. This was particularly important when you remember that UNIX won not rapported until 10 eVIX was not supported until 10 eVIX. Thus, purchosers and ODMs foot to make observations and the contract of the co

XENIX is listed for the 8086, but not the 8088 primorily becouse, os you pointed out, the 8088 and 8086 are functionally equivalent. Listing both chips would be like listing the Z-80, Z-80A and Z-80B as different chips; they differ only in the maximum clock speed.

As to your finol question: Once o program has been compiled, it will run only on the operating system and CPU it was designed for.

The CPU determines the octuol form the mochine longuage instructions toke. You cannot toke compiled software designed for one CPU (say the 8080) and run it on onother CPU (like on 8088). None of the mochine longuage instructions will



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moke sense to the new CPU. Similorly, o compiled program has to hove some way to hondle input ond output for the console and disk drives. Unless there are security or speed resons, this I/O is routed through operating system colls. Moving to a new operating system means that the colls no longer hove the some meaning—

they mov even be meaningless.

I don't know if MS-DOS 2.0 is upwards compotible with XENIX. If so, thot would imply that every operating system coll (vio INT 21hex) exists in XENIX. My guess is that only the newer colls, such as those that use an ASCIIZ representation, are XENIX compatible. Other comments and

information would be oppreciated. Certoinly, UNIX stores files with LF os a line end delimiter, while MS-DOS uses the usual CR-LF convention.

Writing a Word Processor

Q: I am writing a word processing program in BASIC and have the following questions. How can you print an underlined word on the screen without having to use embedded commands? My program creates text by building an array of strings. Thus, poking the screen or using a color

HOW CAN YOU print an underlined word on the screen without having to use embedded commands?

statement will only produce temporary underlining. What I need is a way of saving the underlined word in a string if this is possible.

I also cannot figure out how to use the screen statements to achieve instant screen switching. My local expert claims this is impossible with the monochrome display.

Lastly, is there a way of setting a window on the display so that six or seven lines of text can be set at the top of the screen without having them scroll away? I would like to use the built-in scrolling of the IBM and not have to write my own scroll router.

> Peter Krouwer St. Louis, Missouri

A: There is no simple woy to store an underlined word in memory, ossuming you want to use the PRINT stotement to redraw the word. If you one willing to use POKEs, then it con be done. The simplest method is to store the attribute of each chorocter longside the chorocter itself. Eoch string will be twice os long os you would otherwise expect.

The only woy to disploy the string then is by POKEing for PRINTing) the characters to the screen and then POKEing the ottributes. This is a tedious process of best, in BASIC.



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You cannot use the SCREEN command to effect page switching with the manachrome adopter. It warks only with the calor odopter, which has eight or faur

OU CANNOT use the SCREEN command to effect page switching with the monochrome adapter.

pages of memory in 40- and 80-charactermodes respectively. However, you can do fost page switching using a simple machine language routine.

As to hoving the PC's operating system perform scrolling, please refer to an example I included in an earlier PC Tutor (Valume 1 Number 101 That machine language routine colls IBM's BIOS (basic input output system) scroll mutine to clear a horizontal window. You can just as easily make the routine scroll a harizontol window (by setting AL<>0). I olso suggest you read pages A-43 and A-44 in the IBM Technical Reference Manual.

Finally, if I may ask, why would anyane want to write a text editor in BASIC? Although BASIC has many fine applicatians, text editing is not one of them. You will find the project to be much easier in either Pascal, C. or even FORTH-in fact. any longuoge with nomed subroutines and structure.

Manual Ouestions

O: Under the heading "Sixteen Background Colors" on page 1-9 of the BASIC 2.0 manual, the commands for 40- and 80column widths are given respectively as OUT &H3D8.8 and OUT &H3D8.9. However, page 2-58 of the Technical Reference Monuol shows the bits of 3D8 that control these functions to be bits 0 and 5. Why

&H3D8.32 and OUT &H3D8.33 instead? Also, can I replace the 16K memory chips on my mother board with 64K chips? If so, what type would you suggest I

Finally, my manuals show certain keys doing things that they don't actually do. For example, the Technical Reference Monuol shows Shift-TAB as reverse tab, and Ctrl-PgUp as top of text and home cursor. There are many more of these. Is this a

bug in PC-DOS 2.0? Bill Kraengel, Ir. Valley Stream, New York

A: The 8 comes about because the video signal must be enabled in order to see anything on the screen. Hence bit 3 must be high when you output to the Mode Select Register. Next, the instructions refer to enobling a sixteenth calar, nat chonging from 40 to 80 columns. To enoble the sixteenth calor you need to set bit 5 (the blink bit) LOW (0). Thus, if you were running in 40-column made, you would send OUT 8H3D8,8 where the 8 decampases as fallows:

HEX: MEANING (1) 80-column mode OFF

- f 21 Grophics OFF
- (4) B&W OFF
- (8) Enable Videa ON (10) 640×200 made OFF

(20) Rlink Enoble OFF (Background Color ON)

Next, you cannot change the 16K chips to 64K chips on the PC. The circuitry on the mother board is set up far 16K chips. There is a modification kit avoilable, but



it requires same saldering skill and some cutting of troces on the motherboard.

Finally, those keystrokes you are referring to are only suggested by IBM so that various text editors will maintain compatibility. Microsoft and IBM themselves

weren't the first commands OUT





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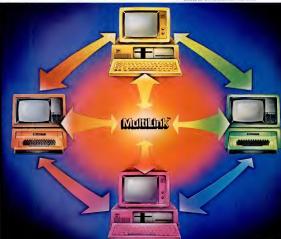
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hove not included ony such copability in PC-DOS or EDLIN.

Hidden Lines

Q: How can the video be shut off during an AUTOEXEC.BAT so tha BASIC command display and my program name are not displayed?

Douglas F. Eilertson Muríreesboro, Tennessee

MOST programs (even copyprotected ones) can be run without rebooting the computer.

A: The simplest opproach is to use PC-DOS version 2.0 and hove the first line of the AUTOEXEC.BAT file be ECHO OFF, which will turn off the disploy of the commond lines until the outoexec is finished.

There is no other woy to do this, besides hoving AUTOEXEC.BAT run o progrom which outomoticolly loods BA-SIC and runs your program, or which electronicolly turns off the video disploy vio on OUT #H3DB.0.

Switching Displays

Q: I have both a monochrome and a color display. It is easy enough to change between them, but when I load a copyprotected program, it reverts to the monochrome display. Is there any way to use the color display for this program without changing the switches inside the PC? Earl Goudh

Altadena, California

A: It depends on the program. Most programs feven copy-protected ones) can be run without frebotting the computer. For exomple, VisiCale. Even though the Cale instructions coll for rebotting before running VisiCale, you can run the program by just putting the VisiCale diskette in drive A ond typing Vi280 to run the 80-column version of VisiCale.

If the progrom will not run without rebooting then I know of no woy to set the color disploy os the defoult without chonging switches internolly. To find out if your program requires rebooting, try this out. Boot the computer ond switch to the color disploy, then put your program disk into the A drive. Now, instead of rebooting, just type <u>AUTOEXEE</u>. This will run the AUTOEXEE.BAT program while keeping the color monitor octive.

Unused Memory

Q: Our office purchased an IBM PC with 544K. It was only after we received it that we learned that standard BASIC will only look at 64K at a time. We have scientific programs with 1,000 lines of code and 20,000 variables that naed all the 544K. Is there any advanced interpreter for sale that a non-expert can use to make the memory available?

Paul B. Blackweider Wadsworth, Ohio

A: If you need o BASIC interpreter, then I om ofraid oil the interpreters I know of ollow only 64K of doto oreo. This is one loreo in which the 8088 does not shine.

The internal orchitecture of the chip (its segmentation) make using more than 64K for a data orea or relatively difficult task. Given that the ROM BASIC is primorily o translated 8080 program, using all 544K would have increased the translation task considerably.

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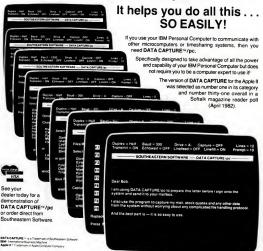
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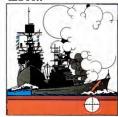
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New On The Market

HARDWARE

Microsoft Mouse

A mechanical mouse for moving and positioning cursors on display screens. The device requires no special surface to move across, and is equipped with two userdefinable buttons to activate decision alternatives or

commands from the screen. The Microsoft Mouse is packaged with three software programs designed to teach the use of the device. The first is a musical tutorial that tesches how to point with a mouse by moving the cursor around on a piano keyboard displayed on the screen. The user positions the pointer on a key and then presses a button, causing the computer to sound a musical note.

The second program is the Game of Life, designed to help users refine their skills and to acquaint them

with command lines. The third program included with the package is Multi-Tool NotePod, a text editor program with insert and delete features. (List Price: \$195) Microsoft Corp. 10700 Northup Woy Bellevue, WA 98004 (206) 828-8080 Telex: 32 8945

CIRCLE 800 ON READER

SERVICE CARD

DCP/88 Companion Processor A co-processor board, based

on an 8088 microprocessor, that offers 64K bytes of dual ported RAM, up to four communications lines, and a high speed printer port. Programs written for the PC can be executed on this board simultaneously with other programs executing on the PC. Two or four channel versions are available as standard configurations. supporting asynchronous, bisynchronous, SDLC or HDLC line protocols. Full modem support is provided, as is a modem eliminator option. An optional parallel printer port can also be ordered, supporting either Centronics or Data Products interfaces.

When used with Persyst's PC-HASP software, the board/software combination allows the user to transfer text, binary, or user-defined combinations of data between a mainframe and the user's system. The user may assign I/O streams to a variety of different devices. such as disks, printers, or RS-232 ports. (List Price: Bosic model \$695) Personal Systems Technology. Inc. 15801 Rockfield Blvd., #A Irvine, CA 92714

(714) 859-8871 CIRCLE 7% ON READER

SERVICE CARD



DCP/88 Processor. Personal Systems Technology

Timeport and Uni-port

Two single-slot modules designed to provide communications capebilities without adding RAM memory. Timeport provides up to two serial ports and one parallel port, up to 4K bytes of static RAM or 16K bytes of EPROM, plus a calendar

clock. Uni-port provides the user with a single parailel printer port and a calendar clock.

The clocks on both boards are equipped with five-year rechargeable backup batteries. (List Price: Timeport \$295; Uni-port \$1951

Personal Systems Technology. Inc. 15801 Rockfield Blvd., #A Irvine, CA 92714 (714) 859-8871

CIRCLE 7M ON READER SERVICE CARD



Linewriter 400

A 132-column band printer utilizing a linear free flight print hammer and low band speed to achieve uniformity of print quality. The unit offers a range of print bands. including statistical bands in 48, 64, 96, and 128 character sets

Other features of the Linewriter 400 include eight selectable diagnostic routines, multiple interfaces, e long-life cassette ribbon, and a four digit alpha-numeric display. (List Price: opproximotely \$5,0001 Centronics Data Computer Corp. Hudson, NH 03051 (603) 883-0111 TWX: 710-228-6505 Telex: 94 3404

CIRCLE 799 ON READER

SERVICE CARD





BvtCom 212AD

Modem A modem providing 0-300 beud and 1200 baud full-duplex data transmission. Unit has e built-in memory storage capacity of nine telephone numbers (40 digits).

A user can originate e call by entering either the memory position of the stored number or the name of the party to be called. An answer-back of up to 16 characters can be programmed end transmitted automatically upon connection with the party. The unit also provides a software disconnect feature, enabling the device to terminete e call upon receipt of a userdefined charecter sequence. A remote boot capability can be used to reset the user's system upon receipt of a preset command sequence.

Sup'r Extender An expansion unit that can

provide six additional slots for user-designated boardlevel peripherals. It connects to the user's system through two 60-line ribbon interface cables and a host adepter cable. Power for peripheral boards installed in the unit is provided by a built-in, line-powered switching supply. (List Price: \$5001 M & R Enterprises 910 George St. Sonto Clara CA 95050 (408) 980-0160

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dialing are interchangeable within a stored number sequence to allow a user on e pulse circuit to dial over MCI and SPRINT type lines. (List Price: \$795) BytCom 2169 Franscisco Blvd., #H San Rofoel, CA 94901

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seven weeks in advance of the first week of the issue month. For example, for the August issue, all material must be in our hands no later than the middle of June, approximately 2 weeks before the ad closing date. Submissions must include retail price, distribution methods, and

details of required hardware and software. Include a phone contact for both marketing and technical questions.

The details for the product announcement should be submitted in typewritten form, double-spaced on one side of the paper. Whenever possible, include 8×10 glossy photograph of the product in black & white or color. If applicable, include screen photographs. For best quality, direct camera screen images are preferable to photographs from the monitor.

All material should be sent to: New on the Market, PC Magazine, 1 Park Ave., New York, NY 10016.

New On The Market



DTC 380Z Printer. Data Terminals & Communications

DTC 380Z Printer A deisy wheel printer incorporating a 48K character buffer memory and print speed up to 32 characters

per second. Other feetures include full bi-directional printing, proportional specing, seriel and parallel interfaces. Diablo-compatible software, grephics plotting, 50 to 19.2K beud input capacity, and e momentary pause capability for paper, printwheel, and ribbon changing.

The printwheel is eveileble in different fonts and works with standard ribbons. A self-diegnostic routine tests the unit and its internal CPUs while the printer is isoleted from the user's system. Error conditions are indicated by status lights.

Optional extras include e sheet feeder, forms tractor. type fonts, and interconnecting cables. (List Price: \$1.495) Dato Terminals & Communications 590 Division St. Compbell, CA 95008 (408) 378-1112 TWX: 910-590-2436 CIRCLE 718 ON READER SERVICE CARD

Strobe 260 Graphics Plotter

An eutomatic six pen plotter that ellows the user to plot graphs end charts utilizing up to six different colors with automatic pen changes. Included softwere enables the user to preselect colors before initiating the plot. At appropriete times during

plotting, the pen change routine is automaticelly invoked to change pens without further interection from the user. The pens (supplied) are held in e cartridge. Each color pen is individuelly replaceable.

Software for the Model 260 ellows the user to generate high resolution bar charts, pie charts, and line grephs (500 steps per inch in both the X and Y directions). Alphenumerics are also included for lebeling the charts or creating pages of text. (List Price: \$995) Strobe Inc.

897 Independence Ave., Bldg. 5A Mountoin View, CA 94043 (415) 969-5130 CIRCLE 716 ON READER

SERVICE CARD

Micro Slave A Z-80A based co-processing board that can be eddressed through the user's system's I/O ports and operetes independently of the system. Features of the board include e 4 MHz clock, four 28-pin sockets for use with EPROMs or RAMs, two 8-bit input letches for date or commands. two 8-bit output letches with flag bits for data or status, as well as a Z-80A mi-

memory, data encryption alporythms, program protection peckages, and multiuser access. (List Price: \$271-\$534, depending on configuration) Cryptext Corp. P.O. Box 425 Northeate Station Seottle, WA 98125 (206) 364-8585 CIRCLE 777 ON READER SERVICE CARD

croprocessor. Three configurations are evailable, offering additional

Micro Slave, Cryptext Carp.

Personal PENPAD A deta input device that

A use input device that converts handprinted data to computer code as if is being written. Consisting of a digitizing pad, pen, and monitor, the device allows business forms and similar preformatted materiel to be filled out and inputted into the system file either simultaneously or in a buffered

mode.

The PENPAD will eccept
a wide latitude of print
styles, analyzing the movement of the pen as it is used
and displaying the result in
ASCII charecters on the
screen. To make corrections,
the user can write over or

use a delete symbol. Four modes of operation are available to the user. In Line Buffered Mode handprinted characters are transferred to the file as they are written. Page Buffered Mode allows the user to load an entire filled-out form at one time Charecter Coordinate Mode allows the PENPAD to operate in full-duplex with the user's system, working within e user-defined grid to locate charecters on-screen as they are created. In Graphics Input Mode, the device works as a digitizer, allowing both text and graphics to be entered. (List Price: \$3,500) Pencept, Inc. 39 Green St. Wolthom, MA 02154 (617) 893-6390

CIRCLE 710 ON READER

SERVICE CARD



Koalapad Touch Tablet A touch tablet and supporting software that allow the user to draw directly on a displey screen, bypassing the keyboard. The tablet connects to the user's system vie a single cable. The user draws on the tablet with finger or stylus, creeting an image that eppears on the displey screen. The user can also select, with the eppropriate software, various shapes, shadings, and "paint brushes" from a menu to create images on the screen, (List Price: \$125: odditional programs \$50) Koalo Technologies Corp. 4962 El Comino Real, #125 Los Altos, CA 94022 (415) 964-2992 CIRCLE 779 ON READER SERVICE CARD

Quickon

A device to speed the time it takes to bring a user's system up to operating condition. The unit causes the system to skip RAM tests, making the disk drive come on in approximately three or four seconds, regardless of the size of memory.

It is installed by removing the system's BIOS ROM, plugging the ROM into the device, then plugging Quickon into the ROM's socket. (List Price: \$49) Security Microsystems 16 Flogg Pl. #102Q Staten Island, NY 10304 (212) 667-1019

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AMDISK-V Disk Drive A double-sided, double-den-

sity floppy disk drive that is plug-compatible with standard 51/4-incb drives, but occuples only half the spece. The units can be internally mounted in the user's system. Recording format, data transfer rate, and disk rotation speed are identical to industry-standard 51/4-inch drives. (List Price: \$399) Amdek Corp. 2201 Lively Blvd. Elk Grove Villoge, IL 60007 (312) 364-1180 Telex: 25 4786

CIRCLE 776 ON READER SERVICE CARD

AMDISK-V Disk Drive. Amdek Corp.





New On The Market

Type & Print Typewriter Interface

Typewriter Interface
An interface device capeble
of converting standard Olivettl Praxis 30 and 35 portable typewriters into letter
quality computer printers.
The device allows the portable typewriter to be disconnected from the user's system for continued use as a
typewriter.

Used with a Praxis Model 35 typewriter, the device allows a condensed type font. (List Price: \$179) Requires: Centronics-type parallel port, cable. Applied Creative Technology, Inc. 2723 Ave. E Eost. #717

Arlington, TX 76011 (800) 433-5373 (817) 281-6905 CIRCLE 778 ON READER SERVICE CARD

IRMALINE and IRMALETTE A self-contained protocol

converter allowing communications between a user's system and an IBM 3270 controller over standard phone lines. IRMA-LINE is linked to the controller vie e coaxial cable. The device provides asynchronous deta in IBM 3101 or DEC VT100 format and allows a user's system emulating these terminals to communicate with and capture data from the mainframe system as an IBM 3278 display.



HMALINE, Technical Analysis Corp.

An optional companion product to IRMALINE, the

IRMALETTE Asynchronous

Interface Card, provides se-

capture capebilities, and can

work with any software de-

lective data transfer and

Graphics ConvertaBuffer

A printer buffer that allows the user to produce business graphics generated by such programs as 1-2-3 and MBA on letter quality printers. The Graphics ConvertaBufer translates the Epson Gruftrax graphics data output from the software into the format necessary for printing on a letter quality printer.

The device can accept deta from the user's system at rates up to 1K characters per second, storing up to 64K bytes of deta in its memory. It features a bufferclear button on the front panel and a status light indicating when the unit has automatically switched into the grephics mode. Units are equipped with built-in cables and power supply. (List Price: \$4991 von Leivendyke Enterprises Silvermine Ave. Norwolk, CT 06850

(203) 846-4973 CIRCLE 723 ON READER SERVICE CARD

veloped for use with the IRMA communications board. (List Price: IRMA-LINE \$1,395; IRMALETTE \$3251 Requires: IBM 3101 or DEC VT100 Terminal Emulator software, asynchronous adapter or IRMALETTE. Technical Analysis Corp. 120 W. Wieco Rd., N.E. Atlanto, GA 30042 (800) 241-IRMA (404) 252-1045 Telex: 54 9600 CIRCLE 790 ON READER SERVICE CARD

Type & Print Typewriter Interface, Applied Creative Technology



SuperVision Interface Board

A plug-in board offering the ability to display spreadsheet data on-screen in 132 columns by 44 rows deep. Additionally, with a graphics edapter, the board can generate dot-addressable graphics of up to 720 by 348 dot format

The SuperVision board includes a parallel port compatible with IBM's monochrome board. Also included is a full-screen editor which operates in both 80 column and 132 column modes. (List Price: \$795) Californio Computer Sys-250 Caribbean Dr. Sunnyvale, CA 94086 (408) 734-5811 Telex: 17 1959 CCS SUVL

CIRCLE 796 ON READER

SERVICE CARD

Z-Plus Co-processor Board

A Z-80 co-processor board which enables the user to execute CP/M 2.2 or 3.0 programs, making available software programs not available to PC-DOS or CP/M-88 users before

The Z-Plus board has a Z-80B microprocessor, up to 192K bytes of dual-ported memory, and an asynchronous communications interface. When the Z-80 is not in use, the memory may be accessed by the user's 8088 processor. Parity checking is used by both the Z-80 and the 8088. The asynchronous communications port may be configured as either COM1 or COM2, Under CP/ M 2.2, 64K bytes of memory are used: with CP/M 3.0. 192K are available. Osborne floppy disk formats are also supported. (List Price: \$795)

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SuperVision Interface Board, California Camputer Systems





ITC-PC 9-Track Drive. Alloy Computer

Versa-RAM Plus II.

Model 512M-XAP A modular multifunction expansion board featuring a clock/calendar/alarm, Versa-Ware RAM-DISK/Spooler software clock/calendar support software, and a diagnostics utility program. The board comes with 64K RAM standard, expandable to 256K onboard, or to 512K through add-on modules. With the plug-in memory modules, the user can add

also one of several other function modules, such as a 64K printer spooler, a second asynchronous communications port with optional game adapter, a synchronous SDLC/HDLC communications port, color graphics adapter, and a floppy disk controller. (List Price: Bosic 64K unit \$429) Memory Technologies, Inc. 4343 Grand Prix Dr. P.O. Box 508 Logansport, IN 46947 (219) 722-1454 CIRCLE THE ON BEADER SERVICE CARD

ITS-PC 9-Track Tape Drive

A 9-track controller and tape drive offering 42 megabytes of working or backup storage, and a disk-tape transfer rate capability of one megabyte per minute. The device can support 1600 BPI tapes with userspecified formats from 128

to 9K bytes per block The ITS-PC 9-track drive is available with or without an integrated Cipher tape drive, and includes PC-TIP (Tape Interchange Package) software, which controls reeding, writing, and dumping operations. PC-TIP also provides utilities that enable users to customize their own drive operations. (List Price: \$6.9951 Alloy Computer Products 12 Mercer Rd. Notick, MA 01760 (617) 655-3900 CIRCLE 789 ON READER SERVICE CARD

New On The Market

PC-BACKUP Cartridge

Drive A 4-track, 6,400 BPI cartridge tape drive that can accommodate 13.4 megabytes of data per 450 feet of tape.

and 16.5 megabytes on the 555 cartridge. The unit includes PC-TIP

(Tape Interchange Package) software that controls reading, writing, and dumping operations. (List Price: \$1,995) Alloy Computer Products 12 Mercer Rd

PC-BACKUP, Alloy Computer Products

Notick, MA 01760 (617) 655-3900 CIRCLE 788 ON READER SERVICE CARD



The Sysgen Image A streaming cassette tape

backup device for the IBM PC/XT. The device includes controller, drive electronics and tape drive. It is compatible with either PC-DOS or CP/M-86, and can perform archival backup of data on a hard disk at the rate of up to 2.5M bytes per minute. Storage capecity is 20M bytes. The Image gives give the

user a choice of two backup modes. PRESERVE backs up data from an individual disk volume and restores the data on an individual disk

volume in an image fashion. An additional catalog utility scans the entire streaming tape to list all files by tapefile I.D., size, and other cate-

FILESAVE allows individual files or groups of files to be saved from the hard disk to the streaming tape or vice versa. The catalog utility gives the user the choice of all files on tape, a specific range of files, or a particular file. (List Price: \$995)

Sysgen, Inc. 47853 Worm Springs Blvd. Fremont, CA 94539

(415) 490-6770 Telex: 49 90843 CIRCLE THE ON BEADER SERVICE CARD

SC821 Smart Cable An RS-232C interface cable

incorporating onboard logic circuitry. It connects all handshake lines used in specific applications, and can function at baud rates up to 19,200. Indicator lights are acronyms for the following conditions: Date Terminal Ready, Data Sent Ready, Clear To Send, Ready To Send. These indicators, as well as two more. for Modem and Terminal, aid the user in locating which device is disabling data transfer in the event e hardware or software problem should exist. (List Price: \$245)

IQ Technologies, Inc. 11811 N.E. First St., #308 Bellevue, WA 98005 (206) 451-0232 TWX: 910-443-2308

CIRCLE 786 ON READER SERVICE CARD



Smartmodem 1200B

and Smartcom II A board modem that can operate at transmission speeds of 300 or 1200 bps. Functionally equivalent to the Haves Smartmodem 1200 with an asynchronous adapter, the 1200B is designed to fit within the user's system, eliminating the need for a separate communications card. A telephone jack on the board permits a direct connection to a telephone line on either touchtone or pulse dialing system. Both types of dialing may be used simultaneously in one call. A speaker, with volume con trol, mounted on the board. allows a user to bear the

progress of a call. Packaged with the 1200B is Smartcom II. a program controlling data transfer and

which allows the use of a printer and disk drives while on-line with another computer. It is supported by "belp" screens displayed on demand to clarify a parameter, prompt, or message. The program divides data into units called Macros. One Macro is reserved for automatic log-in; up to 26 Macros and variable parameters may be stored for each remote system called. The program disk is pre-programmed with Macros for several commercial information services. (List Price: \$599) Hoves Microcomputer Prod-

note Inc. 5923 Peochtree Industrial Rlvd

Normes GA 30092 (404) 449-8791 CIRCLE 795 ON READER SERVICE CARD

Smartmadem 1200B & Smartcam II, Hayes



PCnet

A hardware/software package that allows up to 128 users to link their systems into a common local area network. The hardware con sists of a single-slot PCnet Adapter board that plugs into each user's system. The board incorporates a plug for 75-ohm coaxial cable that can run up to 7,000 feet, and provides a data transmission speed of approximately 1 megabit per second.

Each Adapter comes with software that integrates the network into MS-DOS. This MS-DOS interface is designed to allow standard single-user applications to run without disconnecting from the network. The software allows for disk sharing, file locking (restricting access to a file to one user at a time), multi-tasking, and printer sharing functions. The multi-tasking feature allows a user on one system to run commands on another system by remote. Thus one system can act as an "execution server" for the other systems and can print files, assemble programs, and format text while the other systems perform other work. (List Price: Adopter Card \$695; com-

Orchid Technology, Inc. 487 Sincloir Frontage Rd. Milpitos, CA 95035 (408) 942-8660 CTRCLE 719 ON READER SERVICE CARD

plete two-system Starter Kit \$1,490)



Tarea II Hard Disk Drives. CMC International

Targa II Hard Disk Drives A hard disk drive unit avail-

able in three models. The first is a single drive only device with three formatted storage capacities of 5. 10. or 15 megabytes. The secand offers the same configurations, but provides a slot to allow the user to add a second comparable drive as the need arises. The third model offers the user room to install five additional I.B.M. expansion cards as computing needs increase. (List Price: Model 1 with 5 Mb \$1,490, to Model 3 with 15 Mb \$2,445) CMC International CMC International Building 1720 130th Ave. N.E. Bellevue, WA 98005 (206) 885-1600 Telex: 15 2556 TAC CIRCLE 717 ON READER

SERVICE CARD

New On The Market



Commond Control Mouse, Wico Corp.

Command Control 50-2111 Mouse

A mechanical mouse that is ergonomically designed to fit a user's hand. It incorporates optically-coded wheels that do not require a grid pad. Three pushbuttons located at the bottom of finger wells provide the user with a wide range of user-defined command options. (List Price: \$99.95) Requires: Model 50-2070 Controller Card. Wice Corporation Consumer Div. 6400 W. Gross Point Rd. Niles. IL 60648 (800) 323-4014 (312) 847-7500 Telex: 28 9413 CIRCLE 721 ON READER

SERVICE CARD

TEAC 5¼" Disk Drive A half-height, 5¼-inch disk drive featuring low power consumption, low heat generation, and a low-noise, brushless DC direct drive

numbers Do United Landson Montor. Its ball-beight configures to fitted into the space of two conventional height units. (List Price: \$290) Moynard Electronics 400 E. Semoron Bivd., #207 Cosselberry, FL 32707 (305) 331-6402

SERVICE CARD

Xacom Series 8 Winchester Drives Two Winchester-type hard disk drives. The Model 810 features a single 8-inch 10.8 magabyte removable cartridge. It is designed as a backup storage unit. More than one user system may

be linked to the drive simul-

taneously.

The Model 853 fixed drive can provide formatted storage capacity from 10.6 MB to 84.8 MB. Both models provide automatic seek and verify, automatic head and cylinder switching, and sector interleaving. (List Price: 810: \$4,550; 853: \$7.801)

Xocom Technology Inc. 560 Forbes Blvd. South San Francisco, CA 94080

(415) 952-1512 CIRCLE 781 ON READER SERVICE CARD

AJ 1211 Modem A combined 300/1200 baud modem compatible with

Bell 103212A dial-up communications modems. The modem is available in three configurations. The AJ 1211 is a stand-alone, full duplex modem with auto answer capabilities for unattended operation. The AJ 1211-AD is the same, but with an auto-tailing feature that allows a user to enter phone numbers into memory, eliminating the need for a telephone on the data line.

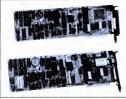
The AJ 122-RM is available as a modem card for mounting in equipment racks such as the AJ Series 8 Multiple Modem System.

Multiple Modern System.
All units connect to
phone lines through either
standard R1-11C modular
jacks or R1-41S and R1-45S
data jacks. An internal microprocessor within the unit
continuously performs selftests and diagnostic analysis. When answering calls,
the modem is capable of automatically selecting the
proper protocols and data
transfer rates.

Internal memory will hold 10 telephone numbers, individually ps-programma-ble. (List Price: AJ 1211 S625: AJ 1211-AD S875: AJ 1211-RM S645) Anderson Jocobson. Inc. 521 Charcot Ave. San Jose, CA 95131 (406) 286-7860

TEAC 51/4 Disk Drive, Maynard Electronics





2ndMATE & 3rdMATE Boards, Tecmar

Tecmar 2ndMATE and 3rdMATE Boards

Two plug-in multifunction boards. The 2ndMATE card provides the user with two serial ports, two parallel ports, a real time clock/calendar with independent battery, serial and parallel cables, and support circuitry for an optional PAL (programmable array logic) de-

The 3rdMATE card offers a 300 baud direct connect auto-answer modem with a standard RJ-11 jack, a serial port, two parallel ports, a battery-powered real time clock/calendar, PAL support circuitry, and serial and parallel cables.

The PAL device can be used to provide the user's system a unique I.D. that can help protect software or restrict access to user's files. (List Price: 2ndMATE \$295: 3rdMATE \$445) Tecmar, Inc. 23600 Mercantile Rd. Cleveland, OH 44122 (216) 464-7410 Telex: 24 1735 CIRCLE 793 ON READER SERVICE CARD

Tecmar Mini-cabinet

Memory Drives Five versions of mass mer ory storage in a mini-cabinet aesthetically matched to the IBM PC. The drives include 10 Megabyte, 15 Megabyte, and 28 Megabyte (formatted storage) Winchester drives; a 5 Megabyte removable-cartridge Winchester; and a 6.25 Megabyte Bak-Pak multiple-floppy-stack drive designed for backup of programs on hard disk drives.

The fixed and removablecartridge Winchesters include a PC-Mate Winchester Share Adapter, which provides resource sharing, allowing as many as four systems to share a single Winchester unit. Also included are software utilities, as well as built-in power supplies and cables, (List Price: 10 MB \$2,495; 15 MB \$2,895; 16 MB \$3,995; 5 MB removoble cartridge drive \$1,995; cartridges \$90; 6.25 MB

Bak-Pak \$1,595; Disk packs

\$95) Tecmor Inc. 23600 Mercantile Rd. Cleveland, OH 44122 (216) 464-7410 Telex: 24 1735

CIRCLE 792 ON READER SERVICE CARD

Linkup A communications hardware/software package featuring a programmable plugin board which supports all industry-standard protocols and emulates terminals at data rates of up to 58,000

baud-per-second.

Linkup software options offers TTY, DEC VT52/100, IBM 3101, IBM 2780/3780 emulation, ASCII Block Protocol, and a print spooler. Linkup provides unattended operation, and the package allows the user to communicate with other systems by entering only the telephone number and password for the other system. By pressing a single key, the protocoi and terminal configurations are established. These configurations are stored on disk for each number called (List Price: Board with TTY and ASCII Block Protocol \$795: Software options \$195 each)

Requires: Modem Information Technologies. Inc. 7850 E. Evans Rd. Scottsdale, AZ 85280 (602) 998-1033 CIRCLE 791 ON READER

SERVICE CARD

Linkup, Information Technologies



New On The Market

Microbuffer Printer Interfaces

A series of serial and parallel printer interfaces for Epson printers. The boards, designated MBS-8K, MBS-18K, MBP-16K, and MBP-32K, allow for simultaneous printout and continued use of the computer.

The MBP-16K, designed for parallel printers, contains 18K bytes of RAM. The MBP-32K contains 32K, expandable to 64K. The MBS-8K is intended for use with serial printers and contains 6K bytes of RAM, while the MBS-16K has 16K and is expandable to 32K or 64K.

In all units, data is held in the internal memory and sent to the printer at baud rates from 300 to 19.200. The boards support all Epson commands, and are compatible with Graftrax-80 and Graftrax-80+. The boards plug into the existing auxiliary interface connector within the printer without modifications. (List Price: MBS series \$159 to \$219 depending on RAM; MBP series \$159 to \$279; plug-in additional RAM module for MBS-16K & MBP-32K \$89) Practical Peripherols, Inc. 31245 La Baya Dr. Westlake Villoge. CA 91362

(213) 991-8200 CIRCLE 724 ON READER SERVICE CARD

Microbuffer In-Line Buffer

A printer buffer with up to 256K memory, available with either serial or parallel interface. The device can provide buffering for a variety of output devices including serial or parallel printers, modems, typesetting equipment, word processors, piotters, and remote date entry. The seriel unit allows user to select nine different baud rates, from 75 to 19.200.



Micrabuffer In-Line Buffer. Practical Peripherals

printing of up to 255 copies without tying up a user's system. New data can be sent to the buffer at any time without affecting the copy process. A PASS feature, available on the serial modei, ailows data to bypass the buffer. (List Price: 32K \$299: 64K \$349: additionoi memory modules available at \$179 per 64K) Practicol Peripherols, Inc. 31245 La Baya Dr. Westloke Villoge, CA 91362 (213) 991-8200 CIRCLE 709 ON READER SERVICE CARD

A COPY feature allows

MicroGate and MicroGate II

Two integrated hardware/ software packages that allow an IBM-PC to emulate an IBM 2780 or 3780 terminal using 2780/3780 BSC communications protocol. MicroGate and MicroGate II are configurable for different operating environments, modes, and functions, and allow users to choose between transparent or nontransparent communications, interactive and bath operations, and absolute and conditional branching in batch command streams. in addition, the Micro-

Gete II can be set to operate under the control of a userwritten program, enabling communications to take place unattended between the user's system and the mainframe system. (List Price: \$8951 Requires: 64K, one disk drive, PC-DOS, 80-column disploy, modem. Gatewov Microsystems, Inc. P.O. Box 10998 #542 Austin, TX 78766 (512) 250-9795 CIRCLE 783 ON READER SERVICE CARD





The Genius

An RS-232 version of the Genius full-page display, which can produce a complete screen in less than three seconds. The full-page screen consists of 4,560 characters, 57 lines by 80 characters.

The RS-232 interface functions at up to 19.2K baud, and all interface functions are controlled by a Z-80 microprocessor. Internal memory of 16K bytes provides buffering and a built-

in screen memory. The Genius display is available with white, green, or amber phosphors and provides reverse video and flashing capabilities. A 128character ASCII generator is incorporated within the unit, with the U.S. set standard and German, French. or International European sets available as options. (List Price: \$1,795)

Micro Disploy Systems, Inc. P.O. Box 455 Hostings, MN 55033 (612) 437-2233 Telex: 29 0766 CIRCLE 720 ON READER SERVICE CARD



The Genius, Micro Display Systems

SOFTWARE

FAMILY ROOTS

A family-genealogy program consisting of six modules and seven utilities. EDIT stores basic information for each family member (date and place of birth, death, address, parents, children, spouses, etc.). SEARCH examines data stored by EDIT to find requested information

TEXT allows the user to store notes regarding family members, without character limitation. CHARTS prints descendant charts plus three types of pedigree charts. SHEETS prints all information on one person in a single page format and also prints a family grouping

sheet. Controls allow the user to select formatting and data to be included in the printout.

LISTS prints alphabetized and/or numerically ordered lists of names for as few or as many names as are needed, Finally, UTILITIES generates address lists, sorts and rearranges member I.D. numbers, and prints blank charts

The program modules and utilities are written in BASIC and allow user modifications. (List Price: \$165) Requires: 96K, one disk drive, PC-DOS 1.1. Quinsept, inc. P.O. Box 216 Lexington, MA 02173 (617) 662-0404 CIRCLE 774 ON READER

PCAT

orders.

A program designed to automate telephone marketing. PCAT stores the name, address, phone number, and user-defined data for each client to be called. It can schedule call lists by date and time along with userdefined priorities, and then place these calls sequentially. PCAT also reschedules busy or no-answer calls, and can display a prompter script for qualifying prospects or to assist in taking

The program handles local, long-distance, international, or network dialing. Directly accessible word processing functions enable the user to generate letters, memos, order configurations, etc., during the course of the phone call, (List Price: \$680) Requires: 128K, two disk

drives, 80-column monitor, Haves Smartmodem or Novation Smart-Cat modem, printer.

Arlington Softwore Systems 97 Bartlett Ave. Arlington, MA 02174 (617) 641-0290 CIRCLE 771 ON READER SERVICE CARD

SERVICE CARD

Farm Weather Center A system of integrated program modules to aid the user in crop manegement and seasonal seed selection, pest control, and simulations of field conditions for optimel planting.

The system is composed of a core disk for mein programs with separate disks for each specific crop. Crops currently availebla include corn, stybeans, spring wheat, and winter wheat. The integrated programs utilize temperature, precipitation, and three additional weather verifobles to produce estimetes of crop development, soil moisture, soil moisture,

development, soil moisture, and crop stress. Daily weather data are entered by the user, with editing, processing, and reporting functions controlled by menus. Separate versions of the

systems are available for irigated end non-irrigated farms. (List Price: Core disk \$285; crop disks \$125 for non-irrigated versions, \$245 for irrigated version

(713) 484-3603 CIRCLE 770 ON READER SERVICE CARD Medical Office Management System

A program for medical practices of up to ten physiciens. The program covers accounts recaivable, appointment scheduling and patient recall, and cleim form preparation.

A private billing element of the progrem ellows for time-of-service billing of petients on either a cash only basis or partial peyment besis. Extended billing includes monthly bill printing, an on-demand account review with current data reporting, and special group billing et different times of the month. Daily trensactions are printed to a deily log together with full accounting end fee productivity enalysis listed by doctor. The program can support up to five printers under PC-DOS 2 0 (List Price) \$795.95)

\$795.95)
Requires: 128K, two disk
drives, 132-column printer.
CMA Micro Computer
55722 Santo Fe Trail
Yucco Volley, CA 92284
(619) 365-9718

CIRCLE 773 ON READER SERVICE CARD



Medical Office Management System, CMA

Volkswriter

International Edition
A multilingual version of
the Volkswriter word processing program, capable of
typing taxt in English.

French, Germen, Spanish, and Italian interchangeably. The International Edition

ellows the user to essign foreign character values to standard keyboard keys. Scientific, engineering, and special foreign characters can be printed with estandard delsy wheel printer, as the program uses a pre-set "default character" doublestrike printing technique to create these characters. (List Price: \$225)

Requires: 64K, one disk drive, PC-DOS, printer. Lifetree Softwore, Inc. 411 Pocific St. #315 Monterey, CA 93940 (408) 373-4718 CIRCLE 75 ON READER

SERVICE CARD - CIRCLE SERVI

StretchCalc An integrated extension pro-

gram for VisiCalc that allows users to generate any of eight different types of graphs and charts. Stretch-Calc also allows manipulation of columns and rows with sort and rearrange commands.

commands.

All VisiCalc functions remain unchanged and none
are duplicated. StretchCalc
features a Keysaver Command Fecility, allowing users to repeat sequences frequently used by striking a
single user-defined key. (List
Price: \$99)

Price: \$99)
Requires: 128K, one dlsk
drive, color/graphics adepter, display, IBM or Epson
printer with Groftrax.

Multisoft Corp. 14025 SW Formington Rd. Beoverton, OR 97005 (503) 626-4727

CIRCLE 772 ON READER SERVICE CARD

Ideal APL

A new implementation of the APL language, written in 8088-8086 code, designed to directly address one megabyte of memory and to allow for object sizes of more than 64K elements. Numeric data types bave been extended to allow binary, octal, and bex, as well as logical and decimal. The literal deta type has been extended to allow word elements. Mixed elements are also permitted.

Ideal APL allows full screen editing, page input, and control over color. sound, and graphics. A 255 character set can be generated from the keyboard and can be set through APL. Fifteen other character sets including bit and type paired terminal types can also be used.

Sixteen output devices are supported and the exact combination may be specified and altered from a function line. Ideal APL also features a file system that allows ten groups of storage devices with a maximum of nine identical devices in each group. (List Price: APL character ROM for IBM

monochrome board or Epson printer, \$95; educationof version for educational institutions, \$295; professional version, \$495; mini manual, \$8: full manual. \$38: updates, \$50 each) Requires; 128K RAM. Ideal Computer Systems 88 Robie St. Fundy Trail Moll Truro, Novo Scotia B2N 1K8 Canodo (902) 895,8062 DATAPAC 7735021

The DOCUMENTOR

CIRCLE 263 ON READER

SERVICE CARD

A utility program that can provide the user with a detailed flowchart of any program written in IBM-PC Disk or Advanced RASIC The DOCUMENTOR can print out branch maps to allow the user to determine

the order of program flow. Printouts from a graphica printer will be in block format, and the program is compatible with color displays, (List Price: \$49.95) Requires: 64K, one disk drive, MS-DOS, monitor. printer.

P80Nut Software P.O. Box 490 Lilburn, GA 30247 (404) 469-0056 CIRCLE 768 ON READER SERVICE CARD

Versa-Ware RAM Disk and RAM

Spooler Programs Two programs that use part of the user's system memory to emulate a disk drive or print buffer. RAM Disk uses either 160K or 320K bytes to emulate either one or two disk drives (drive C and D). To the DOS 1.1. operating system, these emulated drives appear identical to the system's internal drives with the exception that they operate at higher processing speeds.

RAM Spooler uses system memory in 1K byte increments as a printer buffer. allowing the user to continue using the computer for other applications. (List Price: Both programs \$49.95 each) Requires: 128K, one disk drive, monitor, printer. Memory Technology, Inc.

4343 Grand Prix Dr. P.O. Box 508 Logansport, IN 46947 (219) 722-1454 CIRCLE 760 ON READER

SERVICE CARD

BANNER

A print utility program that allows the user to print text in three-inch high block letters lengthwise on continuous forms using any parallel interface printer. The program includes upper end lower characters, numbers. and special characters. Also included is a character design editor that allows the user to modify characters and store special symbols and logos

The banners can be up to six feet in length. (List Price: \$32.951 Requires: 64K, one disk

drive, 80-column display, PC-DOS, BASICA, printer. Sam Wilson & Associates P.O. Box 37085 Houston, TX 77237 (713) 772-1927 CIRCLE 760 ON READER

SERVICE CARD ner. S. Wilson & Associate



The Desk Organizer A program that allows users to automate and store on disk their Rolodex-type card files, alarm clock, calculator, automatic phone dialer, and appointments calendar. A gas-gauge-like indicator keeps track of the amount of storage space left on each disk, and the alarm clock feature uses chimes to alert the user to either the time or to prompt the user's memory. (List Price: \$250) Requires: 64K, two disk drives, 80-column display. Conceptual Instruments Co. 4730 Warrington Ave. Philodelphio, PA 19143 (215) 728-7858

CIRCLE 167 ON BEADER SERVICE CARD

Condo Manager A program designed to assist in managing a cooperative homeowners' association. The program combines features of a real property management system with a general ledger system tailored for homeowners' associations. The emphasis of the design is on member payments and charges and the generating of accounting reports.

Condo Manager provides the user with 14 different display screens and 12 types of management and accounting reports, including mailing labels and statements. In addition, there is provision for passing data to electronic spreadsheet programs. (List Price: \$1,400) Requires: 96K, dual disk drives, display, printer, Coleman Business Systems 3854 Arcadian Dr. Castro Valley, CA 94548 (415) 581-7125

TRS to IBM-PC File Transfer Program

A program allowing transfer of data files from Radio Shack Model II 4 12 and Model 18 computers to the IBM PC or XT. Included with the transfer package is a communications program for the PC, as well as an adapter allowing the two systems to connect.

will allow files of any type or length to be transferred. File concatenation is provided, and supported baud rates range from 110 to 9.600 band. (List Price: \$89,951 Requires: 64K, one disk drive, async. adapter. Personal Computer Products 1400 Coleman Ave. #C-18 Santa Clara, CA 95050 (408) 988-0164 CIRCLE 761 ON READER SERVICE CARD

The file transfer program

GraphPlan An integrated business graphics/spreadsheet pro-

gram offering built-in statistical commands, presentation graphics, and sorting and ranking capabilities. The spreadsheet has

built-in formulas, and requires only five keystrokes. for example, to add two rows of numbers. The graphics capability includes automatic generation of legends, numerical data, date, time, and logarithmic X and V axis labels and tick marks

Changes made in the spreadsheet portion of the program are automatically translated to graphics displays, and the user can switch between the two portions with a single keystroke.

GroupPlan prompts the user for information, and is compatible with other Chang Labs programs, such as MicroPlan. (List Price: Requires: 128K, one double-

sided disk 320K drive, MSnos Chong Labs 5300 Stevens Creed Blvd., #200

San Jose, CA 95129 (408) 248-8020 Telex: 334431 WORLDTRDS MNPK

CIRCLE 752 ON READER SERVICE CARD

The Desk Organizer, Conceptual Instruments



CIRCLE 762 ON READER

SERVICE CARD

B.Writer

A document editing/processing program that also can instruct a user in BASiC nmgramming techniques. Source code is included with each copy, with a com-

piled version also available. B.Writer features character and line insertion and deletion, automatic line centering, automatic left or right justification of text, full cursor control, and a help screen. Available print options include underlining, bold print, compressed print, double-wide print, as well as a file include option allowing the user to chain together separate files during printing, /List Price: \$39: compiled version \$59) Requires: 128K, two disk drives PC-DOS BASICA Automoted Information Sys-1503 Ave. I. #203 Lubbock, TX 79401

(806) 762-6604 CIRCLE 766 ON READER SERVICE CARD Statistician's MACE

A program, written in Pascal, that can aid user in analyzing data obtained from surveys and experiments. The program accepts data entered manually or from files created by the program or a text editor.

Statistician's MACE computes simple and multiple

regression estimates and correlations. Analyses of variance tests include completely randomized, factorial, blocked, split plot, repeated measure, as well as least-square designs. The program can also perform the Hodges-Lehman aligned ranks test. (List Price: \$145: documentation only \$25) Requires: 128K, one disk drive, PC-DOS, monitor. MACE Inc. 2313 Center Ave. Modison, WI 53704

(608) 241-4566 CIRCLE 765 ON READER

SERVICE CARD Computer SAT

A preparatory program for the Scholastic Aptitude Test (SAT). The program is capable of diagnosing a student's strengths and weaknesses based on four pre-programmed SAT practice examinations. The program scores the practice exams, analyzes the student's performance, then prepares a study plan and guides the student through a set of study exercises. The Computer SAT pack-

age contains a 470-page handbook. How to Prepare for the SAT, two floppy disks, and e 50-page User's Manual. (List Price: \$79.95) Requires: 48K, one disk drive, monitor. Horcourt Brace Jovanovich 1250 Sixth Ave. San Diego, CA 92101

(800) 543-1918 (619) 699-6335 CIRCLE 764 ON READER SERVICE CARD



Computer SAT, Harcourt Brace Javanavich

The Sales Manager

A program designed to manage data regarding customers, prospects, expenses, sales analysis, and personnel, for sales executives. The program stores both data files of sales (such as volumes, dates, dollar amounts, product numbers). and text files (letters, memos, notes, and contracts). The user can select and print reports on single or multiple records. The Sales

Manager also keeps track of sales quotas and commis-

At any time during the course of a year, the program can analyze and measure current sales activity against preset plans. The system will also forecast. based on preset plans and current status, sales data for the remainder of the year.

The sales analysis portion of the program can report on activity by customer, sales volume, sales representative, branch, region. and customer type. (List Price: \$450) Requires: 128K, one disk drive, PC-DOS, printer. Market Power 11760 Rough & Ready Rd. Rough & Ready, CA 95975 (916) 432-1200 CIRCLE 754 ON READER

SERVICE CARD

sions due.

Wall Street Window A program that charts historical stock quotes from the

Dow Jones News/Retrieval Service. Up to one year of daily quotes or four years of monthly quotes can be retrieved and stored on disk. The program features a data

compression capability, allowing up to 112 files to be stored on a disk, each file containing up to one and one-half years of daily stock quotes.

Display graphics include Hi-Low-Close and volume. moving averages, relative strength, on balance volume, profit/loss, and comparisons between stocks and averages. Charting hy daily, weekly, or monthly prices is user-selectable through interactive menus, and horizontal date units and vertical prices are automatically scaled to the display scale. The program also allows retrieved stock file to be translated into DIF format for use with financial spreadsheet programs. (List Price: \$395: demonstration disk \$75) Requires: 128K, dual douhle-sided disk drives, color/ graphics card, modem, password access to the Dow lones News Service. R&D Software Associates Box 2727 Reston, VA 22090

(703) 476-6597

SERVICE CARD

CIRCLE 753 ON READER

COOK-WARE

A program for the food service industry that can calculate costs of menu items, determine ingredient volumes for serving numbers, and keen track of inventory.

COOK-WARE allows the user to determine changes in the cost of a menu or recipe; print menus from memory; plan new menus with costs; determine requisites for modified diets; and print new recipes with the number of servings, quantity of ingredients, cost per serving. and preparation instructions on one report. The program includes over 250 recipes pre-programmed, which can be used or modified at will. (List Price: \$2,400; demon-

strotion disk \$29.95) Requires: 64K, two disk drives, monochrome monitor, matrix printer. Computron Systems Inc. 5150 S.W. Griffith Dr. Begverton, OR 97005 (800) 547-4801 (503) 643-8730

CIRCLE 751 ON READER SERVICE CARD



PES:WRITE

A word processing program featuring on-screen formatting, one-keystroke "help" screens, and column, tab. and margin setting indications. A status line at the bottom of the screen indicates the document being edited, what line the cursor is on, how much memory

has been used, and the function in progress. The program integrates with PFS:FILE, PFS:RE-PORT, and PFS:GRAPH programs, as well as VisiColc. (List Price: \$140) Requires: 128K, one disk drive, PC-DOS 1.1, printer. Softwore Publishing Corp. 1901 Landings Dr. Mountain View CA 94043

(415) 962-8910 CIRCLE 750 ON READER SERVICE CARD

Quikcalc Loan Analyzer

A financial analysis program specifically designed for calculating costs of loans and mortgages. Calculations include amortization schedules, effective interest rates, interest paid between dates, the impact of loan charges, and the effects of an early loan termination. The program can also calculate unknown variables such as required loan amount, loan term, loan payment amounts, and balloon pay-

The program is designed to work with the VisiCalc or SuperCalc spreadsheet programs, (List Price: \$99.95) Requires: 64K, one disk drive, VisiColc or Super-Colc

Simple Soft, Inc. 480 Eagle Dr. #101 Elk Grove II. 60007 (312) 364-0752

CIRCLE 750 ON READER SERVICE CARD

MS-1 and MS-2 Mouse Support Programs

Two programs to support the use of a mouse with the user's system. MS-1 is a besic control utility allowing the use of a mouse with any PC compatible software package without modifications. Mouse motion and button clicks are automatically translated into user-de-

finable key code sequences. MouseWindow (MS-2) is a more advanced software development program consisting of object modules for mouse tracking, line drawing, and "RasterOp" operations. The routines are written in assembly language and are optimized for high speed. High resolution graphics are supported on the Hercules Graphics Card and the i.B.M. Color Card. (List Price: MS-1 \$20: MS-2 \$401

Requires: MS-1: 64K, PC-DOS, mouse: MS-2: 128K. mouse, color/graphics card. Mouse Systems Corp. 2338 H Wolsh Ave. Sonto Clam. CA 95051 (408) 988-0211 Telex: 487848

CIRCLE 749 ON READER SERVICE CARD

SmarTerm/PC TE400-

A terminal emulator program allowing a user's system to operate as a Data General Dion Dion or D400 terminal. The program allows data transfer at rates up to 9,600 band.

SmarTerm TE400-FT imlements virtually all of the features of the Data General terminals, including multiple windows with independent scrolling and window erase, character display attributes such as underline. blink, dim, reverse video. and protected, and local printer support including

"pass-through" mode. The program also offers the ability to transmit and receive text and binary files using an "error-free" protocol over telephone lines, (List Price: \$125)

Requires: 96K, two disk drives, PC-DOS, monitor, async communications adapter. Persoft, Inc. 2740 Ski Ln. Modison, WI 53713 (608) 233-1000

CIRCLE 746 ON READER

SERVICE CARD

CITATION

A 3.0 version of the CITA-TION electronics filing program, featuring improved formats, an interactive search capability, reduced RAM requirements, and the use of data compression techniques for more efficient

disk utilization. The program stores, retrieves, and cross-references data in three formats: journal/periodical citations, book references, and notes related to companies or persons. A keyword index is automatically maintained.

supporting access to all items by subject. The new version of CI-TATION also permits the

user to observe the success of a database search while it is in progress. The search. based on a list of keywords. can be interrupted and restarted at any time, and the user can vary the degree of matching between the keyword list and the database items during the search. (List Price: \$185: manual olone \$25: demonstration dick \$35) Requires: 96K, two disk drives or hard disk. PC-DOS, monitor, printer. **Eagle Enterprises** 2375 Bush St. San Francisco, CA 94115 (415) 348-1249 CIRCLE 754 ON READER

SERVICE CARD

Citation, Eagle Enterprises



Professor DOS

An instructional training program that guides novice users through fundamental PC-DOS concepts, commands and editing functions. The interactive portion of the program provides approximately 4 bours of hands-on instruction.

Lessons are segmented. and the user is given a choice as to wbether to proceed step by step through the course material or speed un/slow down the learning pace. (List Price: \$59.95) Requires: 64K, ooe disk drive, PC-DOS, monitor. Individual Software, Inc. 24 Spinnoker Pl. Redwood City, CA 94065 (415) 591-4166 CIRCLE 785 ON READER SERVICE CARD

Order Entry Inventory Control & Analysis IIIS



Order Entry and Inventory Control &

Analysis Programs Two business programs compatible with the Easy-**Business Systems software** series, and each other. Order Entry generates order confirmations; calculates prices, discounts, and taxes; maintains back-order status; and priots packing slips, iovoices, and reports. Forms cao be custom-designed using the program's built-in text editor.

Inventory Control and Analysis provides the user with ioveotory status analysis, out-of-stock reports, current inventory valuations.

and gross margin analyses. Both programs are accompanied by instructional disks, and the software prompts the user for information (List Price: \$595

Requires: 64K, one disk drive, PC-DOS 1.1. Information Unlimited Software, Inc. 2401 Marinship Woy Sausalito, CA 94965 (415) 331-6700 CIRCLE 757 ON READER SERVICE CARD

Cdex Training for the EasyWriter II

An interactive personal training program for the EosyWriter II word processing program. The course, in three disks and an indexed reference guide, lotroduces users to key concepts and terms, use of commands. and the printing of documents. (List Price: \$69.95) Requires: EosyWriter II. Cdex Corp. 5050 El Camino Real, #200

Los Altos, CA 94022 (415) 964-7600 CIRCLE 748 ON READER SERVICE CARD

Notehook

A database management system specifically designed for storiog and retrieving text. The program can select aod sort oo any text lo any field, without need of key words to search for records. Selected records can be displayed. saved oo disk or printed. Report formats can be edited with a built-io report editor.

Notebook includes a fullscreen editor with Word-Star-type commands. The data is compatible with other databases and text editors, including dBose II and WordStor. (List Price: \$150) Requires: 128K, two disk drives, PC-DOS or CP/M-86.

monitor Digitol Morketing Corp. 2363 Boulevord Cir. Wolnut Creek, CA 94595 (415) 947-1000 CIRCLE 754 ON READER

SERVICE CARD

LetterBANK/Courier I A business correspondence applications program containing 200 pre-formatted letters dealing with the com mon correspondence needs of small businesses. Letters include sales promotions. personnel, past-due account collections, as well as iohouse memos on subjects such as housekeeping and telephone procedures. Oo the average, there are three versions of each letter, and any letter can be modified by using a word processing program or text editor.

LetterBANK Includes its own merge priot program, Courier I, which allows users the option of sending their letters directly to a printer and bypassing their own merge program. (List Price: \$991 Requires: 48K, two disk

drives, PC-DOS or CP/M-86. prioter. The Wyndhom Group, Ltd.

125 Mirono Rd Portsmouth, NH 03801 (800) 972-5600 (603) 431-4800

CIRCLE 743 ON READER SERVICE CARD



The Stud Poker Parlor, QSI Saftware

The Stud Poker Parlor A game program in which the player is pitted against the computer in games of five or seven hand stud poker. Pleyer options include the size of the bank-rolls and pot, the earte, and one of three play levels (conservetive, normal, or egeonservetive, normal, norm

gressive).

Tha program is dasigned to behave as e human pleyor, including bluffing, concealment, and learning from experience. (List Price: \$29.95). Requires: 64K, one disk drive, PC-DOS, monochrome or color monitor. QSI Software P.O. Box 3-231 ECB Anchoroge, AK 99501 (907) 349-1189.

CIRCLE 740 ON READER

SERVICE CARD

Micro Link II
A communications and electronics mell progrem that
can send ond receive text,
dete, or program files up to
the capacity of the user's
disk drive. Sevaral file-sending methods ere aveileble,
including prompted line-bylina transmission and errorchecked sector transfer.

checked sector transfer. The Micro Link II program is customized for each user's system at time of purchese. (List Price: \$89) Requires: 64K, one disk drive, MS-DOS or CP/M-86, serial port, modem. Digital Marketing 2363 Roulevord Cir. Wolnut Creek, CA 94595 (415) 947-1000 Telex: 17 1852 DIGMKTG WNCK CIRCLE 742 ON READER SERVICE CARD

PC-REGISTER

A menu-driven program integrating inventory control, point-of-sales order processing, customer accounts receivables, and vendor management. PC-REGISTER converts the user's system into a cash register, and is password-protected. The user has the ability

to control pricing, discounts, C.O.D. charges, shipping and handling charges. and to apply credits to a customer's eccount eutomatically. Reports generated by the program include Customer Statements, Inventory Price Lists end Reorder Reports, Meiling Lebels, es well as financial data reports. Up to 20,000 inventory items, 1,000 customer eccounts, and 1,000 vendors can be supported by the progrem. (List Price: \$495) Requires: 128K, one floppy and one hard disk, PC-DOS. Informative Softwore 33 Andover Ln. Hicksville, NY 11801 (516) 822-2377 (516) 467-1801 CIRCLE 710 ON READER

SERVICE CARD

Micromarkets II

A detabase program for use by seles researchers and sales managers. Micromorkets II is designed to work with VisiCol-type spreedsheet programs, and is preprogrammed with deta from the 1980 Census and from the 1980 census and from the 1983 estimates of Morket Stotistics, Procedures of the Survey of Buying Power.

The program contains 34 demographic and retail sales variables for each state and for each of the 50 largest metropolitan areas. Twelve variebles are provided for each of the 200 lergest metropolitan areas.

Users manipulete the data using VisiCalc or other spreedsheet programs to custom-tailor trading areas and indices of market notentiel. By edding their own companys' sales deta, users can compute their market share in different regions of the country, Micromorkets II stores the deta in DIF format. (List Price: \$99) Requires: 48K, one disk drive. PC-DOS, monitor. printer, DIF-competible pro-Orrington Economics, Inc.

Orrington Economics, Inc P.O. Box 3756 Arlington, VA 22203 (703) 527-5990 CIRCLE 739 ON READER SERVICE CARD

Individual Tax Program

A progrem to help the usar prepare the 1983 tax forms. Four print formats are provided-computer-generated. pre-printed continuous forms, ovarlay transparencies, plus the ability to provide individuel forms for e

single client. The program is written in e CP/M-88 Cobol format, and presents the user with an easily-understood screen. Each field is numbered and explanations for each field number eppear at the bottom of the screen. Error trapping of key items prevents the user from moving to e new screen until ell needed information has been entered Forms and schadules are automatically called up by the program as a result of entered deta.

Feetures include the calculation of the marriage daduction, selection of the lowest tax elternative, end dapreciation computed using the Accelerated Cost Recovery System, which carries over to the correct one of five evailable schoolules C and F end to Form

3468 for invastment Credit. The Individual Tox Program is eccompanied by documentation including sample forms showing tha field numbers assigned. Input sheets are elso provided. as is a copy of the 1982 tax preparation program to facilitate learning, end e Cobol run-time module.

Annuel updates of the program are aveilable to purchesers et one-third of the original cost. (List Price:

Requires: 128K, two disk drives, CP/M-86, monochrome monitor, 80-column printer.

University Softwore, Inc. 1061 Froternity Circle Dr. Kent, OH 44240 (216) 678-4559

CIRCLE 741 ON READER SERVICE CARD

OS Converter A conversion program el-

lowing the user to run progrems written for aither the PC-DOS (MS-DOS) or CP/M-86 operating systems on the same system. OS Converter operates by loading a target progrem into memory end creating the environment to run the terget program. There is no need to interpret instructions; OS Converter

remains in control of opere-

tions. The program is 4K bytes in size, and resides just above the resident operating system in RAM. Use of the conversion system involves no loss of processing speed. (List Price: \$95) Requires: 64K, two disk drives, PC-DOS or CP/M-88. Dynamic Microprocessor Associotes, Inc. 545 Fifth Ave. New York, NY 10017 (212) 687-7115

CIRCLE 747 ON READER

SERVICE CARD

Dental Office Management PC

A database management program for dental precticas. The program includes an eccounts receiveble system for privete patient billing, an insurance claims menegement system for the preparetion and collection of American Dental Association standard claims and pre-euthorizations, end en eppointment menegement system with petient reminder recall.

Dentol Office Monogement PC can prepare bills, forms, ettanding dentists' stataments, account reviews, daily journels, monthly aged eccounts receiveble reports. and practice productivity reports. (List Price: \$859.95) Requires: 128K, two disk drives PC-DOS 1.1. 132-column printer. CMA, Micro Computer Div. 55722 Sonto Fe Troil Yucco Volley, Co 92284 (619) 365-9718

CIRCLE 709 ON READER

SERVICE CARD

Chartman IV

A business graphics program that can produce specielized scatter graphs and GANTT charts, line charts, and a statistical curve-fitting feature. The program features e fill-in-the-form approach to graphics creation. and is designed to lead the user through the creation process using convarsational English, with command instructions corresponding to the kayboard.

Graphics created with Chortmon IV can be printed with the Epson MX80/ MX100 printers with Groftrax, or plotted using IBM or Hewlett-Peckard plotters. The progrem elso displeys

in color on RGB monitors. The program is eccompanied by e usar's menual with a glossary of frequently used computing and graphics terms. (List Price: \$300; with Chartman II \$500) Requires: 128K, one disk driva, PC-DOS, color monitor, graphics card. Graphic Software Inc. 1972 Mossochusetts Ave. Cambridge, MA 02140 (617) 491-2434

CIRCLE 705 ON READER SERVICE CARD

SuperStar

A color support and defaultparameter customizing program for use with WordStar. SuperStar allows the user to select the foreground and background colors for Word-Stor, eliminating the whiteon-black format that Word-Star defaults to when used with e color monitor. Reverse video is supported for

monochome monitors. The program also ellows the user to select default parameters for WordSur from a menu. Once selected, WordSur will continue to use the custom parameters, ellminating the need to reset each time the word processing program is booted. (List Price: \$29.93)
Requires: 126K, one disk

Requires: 128K, one disk drive, PC-DOS, 80-column monitor, WordStar. Relotional Solutions, Inc. 8723 Woodleigh Dr. Houston, TX 77083 (713) 530-4161

CIRCLE 708 ON READER SERVICE CARD

Personal Computer/ Fixed Asset System (PC/FAS)

A program allowing users to keep complete and accurate records of owned and leased property and equipment, for the I.R.S. and state and local governments, insurance companies, and business auditors.

PC/FAS can calculate depreciation and investment tax credits to which the user may be entitled under ERTA, TEFRA, and other tax lews, and can print en I.R.S. Depreciation Form 4562 from data stored. The user may choose to use the deprecietion methods alreedy programmed, or override the methods in favor of user-defined formulas, PC/ FAS elso allows for two sets of depreciation records to be maintained simulteneously. one for the LR.S. and one for equity statements.

85,000 assets can be stored on one interactive file, or 50,000 each on two fixed drives. With a 320K disk drive, 1,400 assets can be stored on each disk, up to a maximum of 99,000 items. (List Price: \$395)
Requires: 64K, one disk drive, PC-DOS. 80-column monitor, printer.

With e fixed drive,

Best Programs
P.O. Box 2370
Alexondrio, VA 22301
(703) 549-3663
CIRCLE 711 ON READER

SERVICE CARD



Personal Computer/Fixed Asset System, Best Programs

AMI Restaurant

Accounting System
An accounting package designed specifically for restaurant management. The
package includes Inventory
Control, General Ledger, Accounts Receivable and Poyoble, and Poyroll.

oble, and Poyroll.
Features include daily
purchases journal and average cost variance report, daily requisitions register, requisition recap by item and
department, over and short
comparison reports, monthto-dete cost distribution,
item cost, item usage analysis, end item cless.

The Restourant Poyroll included in the peckage takes into account tip reporting, and FUTA and SUTA reporting requirements. The program can print W-2 forms, 941As, and QTD/YTD Earnings Reports. (List price: \$2,495) Requires: 64K, two disk drives, PC-DOS 2.0, monitor. Automotion Management

Inc. 5718 Westheimer, #410 Houston, TX 77057

(713) 781-5941 CIRCLE 704 ON READER SERVICE CARD

Office Filer

A detabase management system that teams the user's system function and cursor control keys to create forms in e fill-in-the-blank formet. Files compiled from the forms mey be password-protected. Office Filer supports arithmetic and logical expressions or a combination of both. (List Price: \$395) Requires: 128K, one disk drive, MS-DOS. Digital Marketing Corn.

2670 Cherry Ln. Wolnut Creek, CA 94596 (415) 938-2880 Telex: 17 1852 DIGMTG WNCK

CIRCLE 202 ON READER SERVICE CARD

GrafTalk

A graphics program that uses English commands to produce bar, pie, line, and symbol charts. Diegrams can be preformetted, with variable data added periodically to produce regular reports.

The program features light pen and joystick control support, and can mix different types of graphics on a single chart. GrofTolk conforms to the GSX graphlcs standard, (List Price: \$4501

Requires: 128K, one doublesided disk drive, PC-DOS 1.1, color monitor, graphics adapter card. Redding Group, Inc. 609 Moin St. Ridgefield, CT 06877 (203) 431-4681

Telex: 64 3351 CIRCLE 706 ON READER SERVICE CARD

ACOM-300

A communications program designed to allow users to link their systems to General Electric Information Services Company's (GEISCO) Mark III remote computing network. ASCII files can be received and sent using simple screens, and on-line printer support is provided. A local mode permits user directory listing, individuel disk file viewing, and disk file deletion while remeining connected to GEISCO's Mark III network, ACOM-300 is furnished on a singlesided disk with documentation booklet (List Price: \$49.951

Requires: 64K, one disk drive PC-DOS 1.1 an esync adapter, 80-column display. 300-baud modem, BASICA 1.1.

Allston Group P.O. Rox 1557 Richardson, TX 75080 (214) 235-1631 CIRCLE 707 ON READER

SERVICE CARD

HALO

A graphics program encompessing pre-progremmed subroutines to creete bar charts, graphics, text with a variety of fonts and sizes. and specially designed shapes and textures.

The program's use of world coordinates ellows the user to create graphics on one type of system, then later display the results on another system without modification. Grephics can be stored in memory for onscreen presentations, or reproduced in full color on paper, transparencies, or 35mm slides, using e range of compatible monitors, printers, end cameras. HALO is available to run

under BASIC, Pascal, "C". Assembler, and Fortran. Routines are included which are capable of converting common dot metrix printers into a 960 × 720 plotter, and the program can support the concurrent use of light pens, digitizing tablets, and digitel mice, (List Price: \$150) Requires: 64K, one disk drive, MS-DOS, color/graphics edapter, or monochrome grephics board, monitor. printer or plotter. Medio Cybernetics, Inc. 36 Columbio Ave. Tacoma Park, MD 20912 (301) 270-2272 CIRCLE 701 ON READER SERVICE CARD

IETDRIVE DOS 2.0

A program that uses the extra RAM within a user's system as a pseudo-disk drive. The program works with any RAM boards to create a storage fecility of up to 512K, or up to 2.5 megabytes when used in conjunc-

tion with Tall Tree's 512K IRAM boards. The program allows soft-

ware control of the amount of RAM to be allocated to system and electronic disk, eliminating the need for the user to reset DIP switches inside unit. IETDRIVE can also restore data on the electronic drive after Ctrl-Alt-Del, in case of program hang up. Included with IETDRIVE is IET, e transfer program capable of copying files to and from disk drives, RAM drive, or hard disks, several times faster than the copy utility supplied with DOS.

IETDRIVE will transfer data to and from disks in any of 19 formats. (List Price: \$401 Requires: 128K, PC-DOS 2.0. at least one RAM board. Tall Tree Systems 1036 Los Altos Ave. Los Altos, CA 94022 (415) 941-8748 CIRCLE 705 ON READER SERVICE CARD

Long Distance

Analyzer A menu-driven program for maintaining track of long distance phone call costs. The program organizes and analyzes phone call expenses, identifies parties called, and can produce totsls and costs by which the user may evaluate services such as WATS. In addition. Long Distance Analyzer allows the user to recover phone company billing errors, print an alphabetical directory, and account for costs by category. (List Price: \$195)

Requires: 64K, one disk drive, PC-DOS. Golden Braid Software 1450 Ronchero Dr. Sarosota, FL 33582 (813) 371-0388

CIRCLE 706 ON READER SERVICE CARD

SBB Pascal Compiler A two-pass, locally optimizing Pascal compiler that closely follows the lensen & Wirth definition of the language, with extensions designed to aid the professional programmer in software development. The compiler includes an interactive Pascal debugger, designed to aid in isolating and correcting faults in Pascal programs. Features of the debugger include the abilities to set and display both absolute and conditional breakpoints: set watches on variables, procedures, or func-

tions; display and modify both global and local variables; display the procedure/function stack, current statement and module numbers current run-time requirements, and the last ten statements executed: and the ability to trace through a program by statement number and procedure/function entry/exit.

Also included with the

compiler is a screen editor, canable of insertion and deletion of lines and characters, finding and/or replacing of strings, copying lines of text, and autoindent for entering structured programs. The editor makes use of functions keys, and is provided in source as an example of the advantages of programming in SBB Poscol. (List Price: \$295) Requires: 128K, two disk drives, PC-DOS 1.1, 80-column monitor Software Building Blocks, Inc.

P. O. Box 119 Ithoco, NY 14851 (607) 272-2807 CIRCLE 696 ON READER

SERVICE CARD

Charitable Organization Receipting System (CORS)

A program designed to record and store information on funds received by charitable groups such as churches, service clubs, etc. Income includes business donations, grants, fees, sales of goods or services, or cash collections. Income targets or designations are used to determine what the funds are to be used for (general fund, building fund, etc.). Up to 40 designations may be defined.

Income by source, by designation or both is summarized and reported by the program, and income tax receipts and mailing labels can also be produced. CORS allows up to 900 member sources, 40 income type descriptions, and 40 designations Transaction volume is based on disk capacities. (List Price: \$550 U.S.: \$695 Canodion1 Requires: 64K, two 320K disk drives, PC-DOS, 132column printer. Prairie Dato Systems, Inc. #202-626 Broadwov Ave. Saskatoon, Saskatchewan

S7N 1A9. Canada (306) 384-7110 CIRCLE 600 ON READER

SERVICE CARD

Personal COBOL An integrated applications software development program that includes the programming capabilities of two other programs, VI-SUAL PROGRAMMING and LEVEL II COBOL software. It allows a user to interactively create, analyze, debug, and modify mainframe-level COBOL programs. PERSON-AL COBOL includes full screen editing, forms generating, and program animating functions. The program interprets the source code in a manner similar to BASIC.

On a color monitor the debugging portion of the program highlights the various sections of the program being written in different colors, aiding the user in locating possible bugs. The user can control the speed of the program review process, stop the program being reviewed, examine and modify data, modify the source code, and continue the execution. (List Price: \$400)

Requires: 128K, two disk drives or hard disk. PC-DOS 1.1; color capabilities require color monitor and adapter card. Micro Focus Inc. 1860 Embaracodero Rd. #235 Palo Alto, CA 94303

(415) 858-4181 CIRCLE 206 ON READER SERVICE CARD

Wealth Watcher's Personal Financial

Management A financial data management program. Up to 120 rows of data may be entered, with 13 pre-defined-January through December, and Year-to-Date. Row items are accessed by a user-defined 10-character key consisting of a 4-character prime code, 4-character sub code, and a 2-character detail code. In addition, a 3character sequence code allows row items to be grouped to allow sub totals

on reports. The program includes a sort routine which sorts records by sequence code and key. A 3-character I.D. allows the user to maintain separate sets of files for each financial entity, such as subsidiaries. In addition, the program recognizes three types of files for each entity-Plan, Actual, and Expected. Plan is used to enter a budget for a year; Actual is used to enter data monthiy; and Expected is used for making year-end revisions to the budget and can be automatically updated with vear-to-date Actual to compare estimates.

The program can print 12 period worksheets, and can print in compressed type. (List Price: \$49) Requires: 64K, two disk

Requires: 64K, two disk drives, PC-DOS, monitor, printer. Personal Software Co.

P.O. Box 776 Salt Lake City, UT 84110 (801) 277-3174 CIRCLE 794 ON READER

OUILL

Ā text formatting program compatible with text editor programs such as WordStar and EasyWriter. The program features automatic Table of Contents and Bibliography generation, automatic pagination and paragraphing, multiple type fonts, and supports the capabilities of printers such as Epson, Citch and Okidata.

Citon, and Okidata.
Additionally, QUILL allows multi-file processing, allowing the user to break documents down into chapter-sized files for editing, then chaining the files together for printing as a single document. (List Price:

3249)
Requires: 128K, one disk
drive, PC-DOS or CP/M-86,
text editor program, printer.
Sextant Systems
P.O. Box 251
Holmdel, NJ 07733

(201) 671-7670 CIRCLE 703 ON READER Release 1A of 1-2-3 A new version of 1-2-3 that allows the popular spreadsbeet program to support a larger array of computers and a range of devices such as graphics printers, includ-

larger array of computers and a range of devices such as graphics printers, including the Epson FX-80, MX-80, and MX-100 with Graftrax, the Okidata Microlina series, the Prism Printers, and the IBM Graphics Printer. The program also supports the Hewlett-Packard

HP7470A plotter.

The new version is also compatible with the PC-XT, allowing the program to take advantage of the XT's extended hard disk capabilities and PC-DOS 2.0. (List Price: \$495)

Requires: 128K, one disk drive. PC-DOS.

drive, PC-DOS. Lotus Development Corporation 55 Wheeler Street

Combridge, MA 02138 (617) 492-7171 CIRCLE 700 ON READER SERVICE CARD

ACCESSORIES

ComputerWear Dustcovers

A line of canvas-weave cotton dustcovers with soft inlining, designed to fit the individual components of a user's system. Design features include an ambroidered rose emblem and wovon binding. (List Price: Kepboard \$18. Drive \$18. Monitor \$18. Printer \$18. Monitor on Drive \$38) Contemporary Computer-

1320 36th Ave. San Francisco, CA 94122 (415) 564-0506

CIRCLE 736 ON READER SERVICE CARD

ComputerWear Dustcovers, Contemporary ComputerWear





Rainbow Box Colored Disks, CenTech Technology

Rainbow Box Colored Disks Single-sided, double-density

disks in five colors to aid in filing and classification. Each Rainbow Box contains ten dieks in five colors: red orange, yellow, green, and blue. Other color combinstions are available as special orders. Disks are made of heat-resistant Homopolymer PVC. (List Price: soft box \$34.95; plastic case \$37.95) CenTech Technology Inc. 183 Cottage Ave. Sandy, UT 84070 (801) 281-1800 CIRCLE 732 ON READER SERVICE CARD

No Zap A device to eliminate static electrical charges from users' hands prior to touching knybourds. The device is placed near the ksyboard; prior to using the board, the user touches the metal point on No Zap. Static charges are passed to ground through the device's lead and alligator clip. (List

Price: \$12.95)
KIS Engineering
10C College Ln.
Methuen, MA 01844
CIRCLE 7M ON READER

SERVICE CARD

Continuous Envelopes A line of custom pre-printed continuous envelopes which can be used in any printer accepting a 12-inch wide form. The envelopes can be ordered blank, or with three lines of print in black ink in the upper left corner, in quantities of 200, 500. or 1.000. Additional lines or non-standard type fonts. other colors, or special imprints are available at extra cost. Envelopes are made of 24-lb. white bond stock, and are folded two-up with pocket glued on three sides. (List Price: 200-\$18; 500-\$42.50: 1.000-\$69. unprinted) Micro Formot 1271 W. Dundee Buffolo Grove, IL 60090 (312) 537-2426

CIRCLE 733 ON READER SERVICE CARD

The AB Series Travel and Storage Cases A line of aluminum bound, hardwood cases with

splash-proof seals intended to serve as reuseable shipping and storage cases for precision instruments. The cases are resistant to water. corrosion, and dust, and are made of 1/2-inch birch plywood with a clear varathane finish and aluminum binding along edges and corners. The splash-proof seal at the parting line is made of extruded aluminum with Neo prene sponge inset. Catches. corners, and handles are zinc plated steel.

There are seven styles available. Colors available include white, navy grey, safety yellow, blue, or any standard varathane color.

Custom-fitted, close tolerance poly foam inserts are available from the manufacturer. (List Price: \$85 to \$500, depending on size and model) Schry-Woy Cases One West Mountain Pasadena, CA 91103 (213) 798-591 CIRCE 72 ON READER SERVICE CARD



AB Series Travel & Storage Cases, Schry-Way

The Information

A computer desk featuring tubular steel construction and laminated work surface. Desk height is 27%-inches, width is 41%-inches, and

depth 26-inches.

A pair of optional drawers can be attached to the desk. (List Price: \$255; optional drowers \$65 pair)

Presentation Systems, Inc.

455 Powell St. San Francisco, CA 94102 (415) 956-8399 CIRCLE 737 ON READER

SERVICE CARD

SS-I Systems Stand
A stand for the IBM-PC systems unit or expansion
chassis that allows the unit
to rest safely on its end, reducing the amount of desk
space taken up by the unit.
The SS-I Systems Stand
matches the IBM-PC in color

matches the IBM-PC in colo and styling, and places the systems' on/off switch on top for convenience. (List Price: \$24.95) Curtis Manufocturing Co...

Curtis Manufocturing Co., Inc. 20 Grove St.

20 Grove St.
Peterborough, NH 03458
(803) 924-7803
CIRCLE 729 ON READER
SERVICE CARD



Trunk Disk Storage Units, Leading Edge

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Simplified Guide to Small Computers for Business

An introduction to small business computers, focusing on information a prospective microcomputer buyer requires prior to purchase. This book, by author Daniel McGlynn, covers a range of topics, from the capabilities and limitations of hardware, software, and peripheral devices, to applications in finance, accounting, and marketing. Chapters provide guidelines for computer product evaluation. including outlines and checklists of system fea-

The guidebook also provides sample screen dispiavs and printouts of typical applications programs, a feasibility analysis of factors to be considered prior to purchasing a small computer, and a description of the leading small business systems currently available. (Poperback, \$14.95) John Wiley & Sons, Inc. 605 Fifth Ave New York, NY 10158 (212) 850-6000 CIRCLE 728 ON READER SERVICE CARD

Xpressions

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ames. (\$20 for five issues) Riverside Data Inc. P.O. Box 300 Harrods Creek, KY 40027 (502) 228-3820 CompuServe: 72715.210

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PC Clearinghouse

Software Directory A buyer's guide listing more than 21,000 software packages available for microcomputers. The guide also lists 2,912 software publishers, and 200 microcomputer manufacturers, with crossreferences to hardware, onerating systems, applications programs, languages, and prices

Besides names and addresses of software and hardware vendors and manufacturers, the directory also lists applications programs available for specific needs, which software programs can be used with certain hardware, and what operating systems run on specific microcomputers. (List Price: \$29.95, 850 pgs.) PC Clearinghouse, Inc. 11781 Lee Jockson Hwy. Foirfax, VA 22033 (800) 368-4422 CIRCLE 726 ON READER SERVICE CARD

Introducing the UNIX System

A primer for the novice UNIX user, this book by Henry McGilton and Rachel Morgan covers in detail the UNIX operating system developed by Bell Laboratories. Focussing on version 7 of the system, plus the modifications developed at the University of California at Berkeley, the book demonstrates how to log on, explains the directory structure and file system, and describes UNIX utility packages available such as text editors, document formatters, and electronic mail utilities. It includes a detailed discussion of shells which allow users to define their own commands.

intended as a supplement to existing UNIX system documentation, the book examines such topics as commands and standard files. software development tools. and user-to-user communications. (Poperback, 556 pes., \$18,95)

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CIRCLE 472 ON READER SERVICE CARD

EDITED BY BILL MACHRONE

PC readers help each other by passing along their tips and tales of tribulation. This month's contributions include nuts-and-bolts instructions for installing halfheight drives, cabling a printer, and cleaning the inside of the PC's keyboard.

User-To-User

We Interrupt This Program . . .
In your magazine a reader asked why the IBM PC would mysteriously hang up during single stepping with DEBUG. I noticed the same problem. Today I discovered why:

The 8088 microprocessor that the PC uses has an internal flag, called TF. When this flag has been set by a program (DE-BUC), an internal interrupt (TYPE 1) is generated after each of the computer's instructions is executed. The interrupt forces the computer to a particular memory location where, in the case of the PC, the registers and the instruction just executed are displayed on the CKT.

Now, if an external interrupt to the 8088 (i.e. TIMER) occurs during the execution of the instruction mentioned above, the 8088 will first recognize the external interrupt. The program counter and flags are pushed to the stack, the TR flag claesed, and the first instruction of the TIMER interrupt service routine is executed. After completion of the instructions, the 8088 sacknowledges the internal Single and the program counter to the stack, and start executing in the DEBOC routine. Here the last instruction address executed the TIMER interrupt service routine) and is displayed aiong with the registers and the disassembled instruction.

Everything up to this point is normal for the 8088. It is working as expected. The real problem is that, as far as the PC's





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8259 Interrupt Controller), the TIMER interrupt is the highest priority interrupt pending in the PC. It isn't until the end of the TIMER service routine that the interrupt is cleared. DEBUG has no idea that this situation has occurred and goes merrily along its way waiting for a keyboard entry from the operator. The catch is that

the keyboard is an interrupt-driven device fixed it by release 1.1 of PC-DOS. of lower priority and is locked out by the pending higher priority device, the TIM-

This bug has plagued me from day one. I tried to get it solved through my dealer. I wrote a letter to IBM, but I was referred back to the dealer Well IRM still had not

Timothy S. Anderson St. Michael, Minnesota

Deoling with interrupts in reol time is a real pain. One possible solution is to disoble the timer by zeroing out the countdown register or by mosking it out in the 8259A. This, of course, ossumes that your program is not making use of the clock. Obviously, your clock will be wrong when you're done debugging. Despite its mony capabilitles, the PC is not designed to be o logic analyzer or an emulotor, and con be o less-than-ideol tool for debugging os-

sembly longuoge programs. Restoring Erased Files

Here is a simple way to recover a file that you accidentally deleted. Put the diskette with the deleted file(s) into drive B. and a copy of your PC-DOS diskette into drive A. Then perform the following

- 1-Select drive A. 2-Enter "debug" in response to the
- "A>" prompt, in order to run the debug-3-Use the "load" command to load
- the sectors that hold the directory for the diskette in drive B into memory. For example, a single-sided diskette has its directory on track 0, sectors 4 to 7.
- To load these sectors, enter "1 address 1 3 4" in response to the debugger's "-" prompt. This loads four sectors into memory at the indicated address, starting with relative sector 3 (the 4th sector) on the diskette. The "1" is used to select drive B. I have found that using 4BA:100 as the
- address works fine 4-Scan the memory locations from the address you specified (using the "dump" command) until you find its name listed in ASCII representation on the right-hand side of the screen. Note that the first character of the filename will be an "e" rather than the correct letter; This is due to the fact that DOS changes the first
- character of the name to X'E5' to indicate a deleted entry. For example, if you were searching for a file named "TEST.DAT", you would first issue a "d address" command, and then continue issuing "d" commands until you found the name "eEST.DAT" in the ASCII representation on the right-
- hand side of the display. 5-Determine the address of the 'E5' byte for the filename, and change it to the

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Ciry. Send me a FREE Creative Computing Caralog correct first character of the filename. You would use the "enter" command to do this

For example, if the 'E5' byte of "eEST.DAT" was at location 4BA:120, you would then use the "enter" commend as follows: e 4ba:100 "T"

6-Write the restored directory out to the diskette. Use the "write" command to do this.

For example, to write out the corrections I had made, I would use the following command: w 4ba:100 1 3 4. In effect. this command is the same as the one used to load the date, with the "1" changed to

It is important to remember that the directory for a double-sided diskette is on track 0, sectors 4 to 8, side 0; and track 0, sectors 1 and 2, side 1. This differs from the directory for e single-sided diskette. Operations on a double-sided diskette are thus easiest when performed in two steps: first, on the directory on the first side of the diskette, and second, on the directory on the second side of the diskette.

To load the directory for a double-sided diskette, use this command for side 0: 1 address 1 3 5. Then use this command for side 1: 1 address 1 320 2. Sectors are numbered 0 to 319 for side 0, and 320 to 639 for side 1.

> Michael M. Santo San Jose, California

Although Mike calls this technique "simple," it isn't. Modifying the directory is anologous to ploying with a loaded gun. While it's instructive to see how it's done, you may want to consider using one of the inexpensive utility programs that do the dirty work for you. In any event, practice on an expendable disk before you use this technique to salvage a file on an important disk.

Doubling By Halving

mente

For those looking at the Teac Slimline drives for their PC, e couple of com-

They fit, but just barely. You will need to fabricate a thin strap of metal and drill two holes for the mounting screws to line

up with the drive holes when one is mounted on top of the other. Slide the bottom drive in plece, ettach cables, and slide the second drive in. The last 1/2-Inch is a tight fit. Slide the strap in place next to the drives, and only then attach the bottom drive to the chassis with a screw through the bracket on the inside. Do the same for the back mounting hole and then line up the straps on the top drive and tighten the screws.

There just isn't enough room for the drives to be mounted outside the PC before sliding them into place. They are just e bit quieter than the buzzing Tandons, at least much of the time. Anyone hed experience with the 96-tpi units?

Before putting your Teacs into place. however, you may wish to make e slight modification. The Teec drives have a separate head-loading solenoid that Is not present on Tandons. Those using PC-DOS 1.1 or Speedup will occasionelly have an error if the head hasn't been loaded and a WRITE is issued.

There are several ways around this.



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One is to write a modified version of Speedup that modifies the tenth word in the diskette paremeter table (its address is found by looking et hex 000:78-7B) to some velue other then 0. This seems like a sten backwards though. An alternetive is to modify the drive slightly. The solenoid is at the left

reer of the drive. The actueting meche- immediately, just as the Tandons are. nism is e smell hracket with two springs wound on its shaft. The rearmost spring has e small book that can easily be released (and as easily reetteched) by using a thin screwdriver or tweezers to push its end towards the front, end then to the left. The heed will now he loeded

Hes enyone tried any of the other drives that ere eveileble? I would like to find e quiet drive. Does envone have experience in mounting four thin drives in the cabinet, and know how to cable and power them? Anyone tried the new Tendon TM55-4 thinline microprocessor-controlled drive, with such feetures es euto treck centering?

Dele Reid

Eau Cleire, Wisconsin These are the kind of explicit directions that users prize most highly. The Teoc head-load salenaid is an annovonce, but it's the "right" way to build a drive, Control Dato's (MPI) drives ore quieter, os ore the Qumes. A lot hos to do with the step rate. The foster you step, the smoother the drive sounds, I'd olso like to hear from those of you using nonstondord drives. Did they install eosily? Whot other modifications did you make? How well do they run convprotected softwore?

Hot Wiring

I have e Seettle memory expansion board in my PC. In order to use its serial port to run my Diahlo 630. I hed to reverse pins 2 and 3 in the cable, since the Seattle board thinks It's looking et e modem. All the progrems that use PC-DOS to control the printer, such as BASIC and Supercolc. worked fine.

EosyWriter II. however, hypesses PC-DOS end controls the printer directly.

Figure 1: Wiring diagram far coble cannecting a Seattle memory expansion board's serial part to a Diabla 630 printer.

Seattle Pin Number Diablo Pin Number (femele DB-25 plug) (male DB-25 plug)



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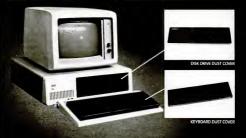
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This is common in word processing programs that must incrementelly control a letter-quality printer. My Diablo 630 was not happy with this arrangement, es it stopped unpredictably and generally behaved erretically. The repair people et Computerland had no solution, nor, initially, did IUS, the supplier of EosyWrite

Rich Brown of IUS finally solved the problem. He suggested rewiring the cable and resetting the size of the ETX-AGA buffer in Eog-Wirter II. These changes completely eliminated the problem and did not affect the programs that print through PC-DOS. Figure 1 shows how to set up the cable that worked on my system. (Note that jins 6 and 6 are 11sed ETX-AGX buffer zize is now 120 instead of the default 350, which is larger then the Diablo's 320-byte memory.

Oregon, Wisconsin RS-232 interfocing con be one of the trickiest challenges in getting computers to tolk to peripherols or to one onother. I plon to put together on orticle boots interfocing in the near future. All reader sug-

Cliff Lawson

gestions and solutions are welcome. Unprotecting BASIC Programs

This tip has been making the rounds of the user groups lotely, but I thought PC should publish it for generol consumption. Noturolly, you won't use it for unscrupulous purposes!

As SOON
as I've saved a program
I find that I need to
access it again.

This program will allow you to list a BASIC program that you bave saved with "P" option. With this option you are not allowed to list or access the program you have just saved. In my experience, as soon as I've saved e program with this option I find the I need to access it again. This need resulted in the program, which is created as follows:

Load BASIC or BASICA.
 Type BSAVE"LIST", 1214.1.

 Load the program that you wish to list.
 Type BLOAD"LIST", 1124

 Now list the formerly protected prorem.
 Upon completion of the first two steps. your directory will show that a new program has been placed on your disc named "LIST"—other name you prefer will suffice. This program can be transferred to other disks or simply recreated on each

> Russell E. McConnell Long Beach, California



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Another One Bites the Dust

After I had used my PC rather vigorously for about a year, keystrokes begen to disappear mysteriously and Intermittently. I found that turning the keyboard on edge and "rippling" the keys could eliminate the problem, or at least shift it from one key to another. Another PC owner I know

found that he could temporarily eliminste the problem by removing the cap of the offending key and blowing into the open-

ing. Others hed similer experiences, sll of which pointed toward foreign metter inside the keyboard interfering with normal key operation.

It made no sense et all to buy a replace-

ment without et least trying to fix the fault. so I bit the bullet and removed the bottom cover. The rest is history.

The cover comes off easily with a 1/4inch nut driver or e flat-blede screw-

HE MOLDED plastic parts aren't gossamer, but they can he broken.

driver, and the cable and connector are eesily removed, even without the eid of a meintenance menuel. At this point, the keyboard essembly ectuelly falls into one's hends. Then the fear sets incan envihing so simple-looking be repeired?

The answer is: "Yes, within limits." Disassembly is simple, and a simple dusting with a lint-free cloth will eliminete most keyboard faults; but, thet just gets you up to where the trouble begins. The reelly tricky part is to get the whole thing back together without breaking anything. However, I'm getting ahead of my story-back to disassembly.

After removing the keyboard cover, you should remove ell of the keycaps except the spacebar. This is easily done by sliding a medium-size flet-blede screwdriver under the keycap next to the key stem and prying until the cap comes off. This is tedious, but it is an essentiel step whose value will be seen

when reessembly is begun. One screw, eccessed from the top of the keyboard, holds the circuit board to the metal freme. Removing this screw allows the top (bleck) metel plete to be moved to the right, separeting it from the bottom (shiny) metel plete. Before ectuelly separeting the pletes, however, one should make sure that the keyboard is upside-down (keys towerd working surfece) over a cleen work aree. Upon disassembly, one finds e printed-circuit board, a number of rectangular plestic key housings, end e plestic plete hinged to move within each housing. These pletes are not ell the same, by the way, so don't swap them around (unless you drop them and heve to make a decision,

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in which case I heartily endorse referring to a two-headed coin). A coiled spring is atteched to each plate. It should not be removed.

The molded plastic perts aren't gossamer, but they can be broken, so careful handling is advisable. One of mine broke, and I succeeded in setting it back together with some acrylic "super" cement, but not before considering a venture into occult mechanics. In retrospect, if I then had the simple Instructions that I'm providing here, the job could have been done without creating such a problem.

At this point, I found e number of bits of extraneous matter floating about. both in the key housings end on the printed-circuit board. I carefully used a damp, lint-free cloth to wipe these gremlins out of my life. Then came the

bard part: reassembly.

All of the plastic plates should rest comfortably in their respective housings, with the exception of the space bar. Now, it is obvious why I said to remove the key cans first-I spent several hours of work regretting not having done so in the first case. The plate for the space bar can be moved into position by hand, and held there with the aid of a thin firm shim: I used a 0.020inch feeler gauge

At this point, either an assembly ite or an extra pair of hands is called for. I enlisted my son's eid. One person holds the assembly in plece (key side down, shim retaining the space keyl while the helper aligns the black plate tebs in the shiny plete slots, then slides the plates together. We found e pair of needlenose pliers inserted into the round hole at the right edge of the shiny plate provided an admirable lever to slide the black plate to the left, engaging the tabs. Once the two pletes are firmly locked together, the screw can be reinserted. The case essembly procedure is reversed to complete the mejor assembly. By the way, be sure to get the cable's ground lug between the beck plate and the mounting stud. It must make firm contact with the metal bottom plete.

Finally, refer to the keyboard layout dlegram in the Guide to Operations manual to reinstall the keycaps, making sure that the spring of each key is centered in the key stem. That's all there is David F. McManigal

Stormville, New York Thonks for the corefully guided tour through the keyboard's innards. Can the same thing be accomplished with a shop vacuum and a brush ottochment?

Remember that "User-To-User" is your column Send contributions to "User-To-User." PC Megazine, One Pork Ave., New York, NY 10016, Please double-space all contributions, provide clean copies of program listings, and include the name of this department on your envelope.



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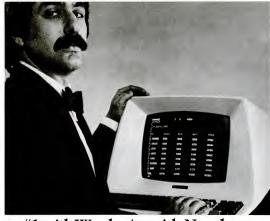
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PERSPECTIVE/WILL FASTIE

Manufacturers and users should admit that the PC and its software are complicated enough to make training and study worthwhile. Also, IBM admits that its mystery socket is for the 8087.

Learning What-To-Do As Well As How-To

At the same time as the PC universe continues to expand and grow ever more complex, software vendors vigorously claim that their products are "easy to use" and "simple to learn." In some cases those claims are justified, but in many they are not. My general view is that the PC, with its associated software products, is a rather complicated system for the average user; it's tough even for experienced users.

I've heard different users' stories about the same product with exactly opposite conclusions: "GoloctiCole is soo easy to use, I learned it in five minutes and it's been saving me time ever since' is one extreme. The other: "GoloctiCole' If lever find out who built it I'll..." or "I just can'. seem to get the hang of GoloctiCole, I think I can do it by hand faster." That's quite a range of reactions.

The IBM PC, or any other computer

that is used for general purpose work, is a complicated device. It requires a learning process, some time to get familiar with the machine and come to understand it. It

A LOT
of computer users have
the notion that you
should be able to learn

as you go.

requires study and concentration. And in this way, it is no different from most things we use in everyday life. We all take driving automobiles for granted, but we all hed to learn the rules of the road, pass written test, and prove their wecould do it by passing a road test, not to mention the practice time we pent to get the hang of it. I recall a Bottlestor Calectice spisoder involvings with to 20th century Barth. As in their incredibly selvenced flying machines, one notes the "precision" with which the automobile drivers below moved together adong the road. While we we take our driving for greated, it prevides an interesting insight.

A lot of computer users seem to have the notion that starting to use the computer ought to require nothing—you should be able to learn as you go. Such people are, I think, too optimistic about the capabilities of the machines of our day. They are also too impatient to accept the learning process. They tend to prefer a system that

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PC Software Interest Group 1556 Halford Ave., Suite #130B Santa Clara, CA 95051 (408) 247-6303 CIRCLE 352 ON READER SERVICE CARD leads them by the hand every step of the way, with menus, extensive on-line help, and vary sansitive error-handling and recovery. What is usually sacrificed in such systems is performance. The user is forced to always wade through long menus, making selections one at a time. An expart user times of this very quickly because the process wastes time that could otherwise have been used for productive work.

EXTRA SECONDS are not trivial to an individual using the system day in and day out.

Proponents of menu-driven systems argue that the extra seconds such systems make you wail are trivial, and allow a less well-trained individual to operate the programs. You can't argue with equal opportunity and motherhood. The extra seconds are not trivial to an individual using the system become experts, which users soon become experts, of the contraction of the contrac

These advocates of the so-called "earper" interfaces argue that the time and effort for extra training and study are more and effort for extra training and study are more speedy and efficient use. I find this is a starler strong argument, especially when accompanied with an exhibit of a Visicoliment of the starley and a starley and a constrained with an exhibit of a Visicolime to the Visicolic example because most versions of the program, at least until this point in time, had what I refer to as a "minimum keystroke" human interface and no on-line help.

Bridging the Levels

For a long time, programs seemed to fall into one or the other of these two classes. WordStor may have been the first program that attempted to bridge the two styles by offering an on-screen menu facility that could be eliminated in stages as the user progressed in expertise. But a

new type of human interface is amerging that combinas the better characteristics of both classes with no loss of performance. It is perhaps best illustrated by Microsoft's Multiple persondback

Multiplon spreadsheet. Multiplon can be operated in one of two ways. At any given time, a menu at the bottom of the screen displays all the options in the form of command words. One of the options is highlighted, and can be selected by depressing the Enter key. The highlighting may be moved by depressing another key until it appears on the desired command, which can then be salected. Furthermore, an explanation of the highlighted option can be had by depressing a Help key. Once the system has been learned, however, the user can simply press the first letter of the command nama dasired, a method that is about as fast as is possible. In addition. Multiplon makes cartain intuitive leaps in response to input. For example, the user can often successfully entar a formula or value at a time when the system initially

A CCOUNTANTS and clerks took to VisiCalc like ducks to water because they already understood the underlying concept.

expected something different; this can be done if the program can unambiguously distinguish such input.

There are other similar human interfaces that are directed towards a broad range of users. It is important to note, however, that such programs address themselves to the question of how to use the system. There is a much more important question: What is it that the system actually does?

any uoes:
The concept underlying a program is much more important than the details of its operation. Like automobiles, many of us take the operating characteristics of VYGGC for organited. What made that program the all-lime best seller was not that it was easy to learn and use, but that what if did was so useful. Accountants and clerks

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took to it like ducks to water because they instantly saw the purpose for which the program wes meant and elraedy understood the underlying conceptual issues. From there, it wes simply learning how to get the program to do their bidding, a simple task by comparison.

My attitude about training aids hinges on this very point. If en eld only teaches on this very point. If en eld only teaches the how to use this system, then it may not be much better then the manual that comes with the product. I'll use Visiclo: as en example again: The manuals supplied with it are of prefty high quality as far as explaining the how-to part. Most of the other books written about the product of the other b

with wast you can so with it has a suppose you want ento counter wast a lampoon you want ento the peace and did a very crisp job of sopialing how to use the program interactively to create end them manipulate date in a file. However, the key to the success and power, the key to the success and power, the law to the success and power of dloser file is not in its interest capabilities—the fact is that dloser if it is command from file, not in its interest capabilities—the fact is that dloser if it is gave no indication of this facet of the programming longuaged The training all gave no indication of this facet of the product Actually, it all that's needed is simple cut of the product of the success and the success of the product of the success of t

My point is simple: Look for training materials that put emphasis on the what and why, rather than on the how-to.

IBM Admits to the 8087

IBM made e number of announcements regarding new products for the PC in June, catching me off guard. In the past, it has usuelly called its new products "enhancements." This time, they were called "capabilities and programs." I'm gled my living doesn't depend on second-guessing IBM.

Included were APL, LOGO, end Privote Tutor, a program that allows coursa materials to be designed and presented. Three coursas for tha tutor were also announced: Learning DOS 2.0 (much needed, I think), Multiplicotion Tobles, and Learning to Program BASIC.

The most significant announcement was "The IBM Personal Computer Meth Co-processor"—known to most of us, of course, as the Intel 8087 numeric processor. The kit can be used on either the PC or XT models, and includes both the 8087

and the most current version of the 8088 chip. Although the reesons for this are complicated, some older 8088 chips do not operate properly when the 8087 is

IT IS possible that calc

possible that calc programs would show significantly improved performance if upgraded to use the 8087

installed. The newer chips were made available in mid-1982, so quite a few PCs will require the new processor chip. The price of the option is \$250 at IBM product centers, which is quite competitive with the open market prices of between \$250 and \$300 (or more) for equivelent pack-

IBM announced little softwara to support the chip, which is sad. I em ebsolute by positive that such announcements will follow promptly, but for now we are limited to the new APL software and progrems from other sources that elreedy take

advantage of the 8087. The significance of the announcement is simple. The PCTS 8088 CPU by itself is no match for the Mostrools 8000 prices or with its 16-bit data path and larger log-sor with its 16-bit data path and larger log-sor with the 16-bit of the simple simp

It is obvious that IBM planmed this all along. The open sockal has been on the system board since day one. Everybody but IBM representatives knew the purpose for which it was intanded. Whetever IBM's reasons were for the timing of its announcement (two possibilities: reliable chips or strategic marketing), the 8088/ 8087 combo will allow IBM to sell the PC in merket niches the stocked to it.

ed to use the 8087.

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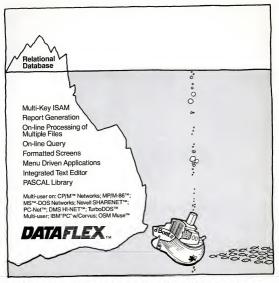
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TAPPING INTO TELEX

TLX-A-SYST

P.O. Box 9002-16 Boulder, CO

(303) 444-6675 Telex 4990706 (XYZZY) List Price: \$250

Requires: 64K RAM, one disk, serial port, modem, word processor, ITT Telex service

Distributed by: American International Distributors

1207 Elm Ave. Carlsbad, CA 92008 (619) 729-2168

CIRCLE 693 ON READER SERVICE CARD

A Telex number at the bottom of a sheet of

letterbead adds a certain catchet; it implies a kind of style and status. But more importantly, it reveals that the sender is part of a global network.

Telex communications have traditionally been the preserve of corporate busi-

DIDN'T
understand the
questions about
password and
answerback names.

ness, the communications industry, government, import-export bouses, travel agencies, and anyone else who needed quick, worldwide communications capability.

Now, you can communicate via Telex with your PC from your desk at the office or at home.

The secret's in the software, specifically a program called TUX-A SYST, a product of XYZZY of Boulder, Colorado. Two-weeks after I first inquiered shout LTVA-A SYST, I was assigned a secret password. A stold a Telex number would earlier soon, a nasweeback identification, and was told a Telex number would arrive soon. I was puzzeled. Why would Telex want to give me a number? But I quickly learned the facts that would make me part of the facts that would make me part of the secretary and the secretary of the secr

Telex itself does not assign a number; it is provided by one of several services that use Telex. ITT was recommended because it charges neither a monthly nor an initiation fee. You pay only for your Telex calls.

BLUE

COMES IN MANY COLORS



BLUE — THE WORD PROCESSOR THE CHOICE ISN'T BLACK AND WHITE ANYMORE.

PRICE: \$150.00 MANUAL ALONE: \$25.00 DEMO DISK: \$10.00

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IBM PERSONAL COMPUTER OR XT. 64K AND ONE DISK DRIVE. DOS 1.1 OR DOS 2.0 MONOCHROME OR COLOR GRAPHICS ADAPTER WORKS GREAT IN MONOCHROME TOO!



2005 BALBOA BLVD., SUITE 256 NEWPORT BEACH, CALIFORNIA 92663 (714) 887-8595 It provides undedicated lines, and talaphone access is provided by toll-free numhere

I was told to call ITT World Communications, ask for a form to fill out, and in about 2 weeks I would have my own privata Telex number. I would be listed in a Talex address book and be abla to communicate with anyone alse who uses Telex through ITT or any other Telex service.

unuugin 11 or any uniner teeks serves, I was cyniach, but i followed through. I phoned ITT at its (800) 424-1170 number, which was listed in my local phone book under ITT. I spoks to an account reprasantative. Everything I had bean told was evidantly trua. "Yas." I said, "I'd like to paply for a number." I was asked for my business nama, my nama, address, and

phona.

Jaked what I'd need, thinking I would be asked for my Dun and Bradstree account number (which I don't have account number (which I don't have an annual income (which I didn't want to reveal), refarences (which I would be reluctant to provide), my list of charge-card numbers (which I resent giving have account representative answered. "A modern, my kind, but will transfer a 300 baud, a computer, the necessary software, and a word processor."

I qualified on all counts. Two days later I received the form to fill out. I didn't understand the questions about password and answarback names, so I left the lines blank. My account representative called and suggested a password compaged of a six-lattra darivative of a nam I sometimes.

CAN YOU imagine how much time it would have taken to get phone calls through?

use as a free-lance writer. My answerback word was "Meilach." Vary creative.

A Seasoned User

While waiting for my Telex number, I pursued the possible advantages of having a Telex number and the required software. In the process, I discovered AI Collins, a man in my local computer society, who has been using Telex for years to conduct business in Australia, Fiji, the Cook Islands, and throughout the United States. I spent a morning with AI in his California backyard office. He convinced me that my PC could asyand my contact with the world without budging ma from my tiny office at home.

At Al's suggestion, we used T.LX-A-SYST to send my brother a happy birthday note at his Dallas office. I didn't know his Telax number, so we phoned the ITT tollfrea number and asked for Telex directory assistance. (It was a waskday during business hours; off-business hours, wa would bave called ITT, via Al's Telax number.)

I prepared the short message on the word processor, naming it BIRTH-DAY.TLX. I brought the Telex program on screen using AI's password, transmitted the file BIRTHDAY.TLX to the Dallas number. In lass than a minute, my mes-

sage traveled from California to Dallas.
Al sat back and said, "No looking for a
card that would cost you about 85 cents.
No 20 cents postage. No rush to get it in
the mail 3 days ahead of his birthday. No
wonderine if it will arrive on time."

"So what did it cost?" I asked.
"About 50 cents," he said. "Ok, now
let's see what you can do with Telex in the

world of big business."
Al brought up his own program and showed me messages be had sent that were "archived" on disk. "Archived" mans there is a log showing the date, time, and messages sent. He could also accass the message and print it out, if the liked. Although impressive, these capabilities were surpassed by the case histories be than ralated.

One account involved the government of Rarotonga. He had to show me where the country was—pointing to a flagged pin in the area of the South Pacific on a wall map. Other pins indicated the location of the countries he contacted regular-ly: Australia, the Cook islands, New Zealand.

"We installed computers in Rarotonga and had a faw problams gatting one of them to boot up. Hare," ha said, hitting a few keys, "that's the message to Rarotonga—and tha answar."

Immediately the dialogua appeared: a few short, cryptic messages that were archived on the disk. "The computers were humming 2 hours after the first massage. Can you imagine bow much time it would have taken to get phone cells

WE USED
TLX-A-SYST to send my
brother a happy
birthday note at his
Dallas office.

through and wait whila thay triad to do this or that? Can you imagine how many days it would have taken to send letters back and forth? Not days. Weeks!"

How much did those Telex messages to Rarotonga cost? Ha chacked the message datas and looked up the bills for that month. Billing is by Telex number, message duration time, and cost per minute. The total was \$8.40. (Most overseas destinations are charged at \$2.90 a minute.)

"Fine," I said. "But not many of my readers deal with someone in the South Seas. What if lonly want to send messages to New York or Chicago, or even Los Angeles, only 125 miles up the coast?"

"Same thing, but cheapar: only 50 cents per minute anywhere in the United States. But the impact is worth hundreds of dollars, and the convenience is incalculabla. You don't worry about business hours, time changes, lunch time, or a person not being there. Compare that with 3 to 5 days for a letter. With Telex they get the message immediately and they answer."

Out From Under Telephone Tag Other users I interviewed joined in praise of Talax. Eliminating the game of talephone tag was the reason most often

How often have you been involved in this scenario? You want to contact someons who is not in whan you call, onca, twica, three times. Or you gat the wrong person and you're deployed from one extension to another, from one screening secretary to another, and you hava to state your business to each. Then the person

you want isn't there. Maybe he gets the message scribbled on the back of an envelope, if it doesn't get lost on his desk. Or he doesn't get back to you for a couple of days, or at all. Or he may call you back and you're not there. You call again and go

THE STORE and Forward utility holds your messages until you ask for them.

through the same routine.

On the other hand, a Telex sent to e compeny will go directly to the right person, end it will be placed on the proper desk and carry the connotation of immediecy, of something really important. Why? Because it has a psychological impact; it spells action.

One user said he uses Telex regularly to elert an associate in a branch of his company in e different city that he wants to talk to him. "The Telex establishes the time and whet i want to discuss. My associate confirms the date by Telex. When the phone call is made, we're well prepared to discuss business."

the control of the the without Teach in importer tool on the without Teach in importer tool on the twithout Teach in the control of the contr

Further Demonstrations I was convinced, but I still had some

reservations. I needed a demonstration.

What if your computer isn't on when

the message comes in? Most of us can't sit end weit for messages. We have other things to do with our computers.

TIT has e Store and Forward utility. It holds your messages until you ask for them. When your computer is on, you

bring up the TLX-A-SYST, phone the access number with your modem, the access number with your modem, the TLX-A-SYST makes contact with that TLX-A-SYST makes contact with that beadquarters in Washington D. C., and you ask to receive a message if there's a message it will appear across your screen in a menner that emulates the Telex machine used in newspaper offices and artifact stations. Vox can decide if and when

you went to spill it onto your printer. So how do you make this all happen with your PC? I've elreedy told you how to get a Telex number. But there is more to it then thet. You will elso require a modem fand an RS-232 modem port with the necessary RS-232 connecting cable), the communication software, and a word processor. For envone just beginning to tep the world of electronic communications, TLX-A-SYST is one of the easiest software communications packages to use. It offers logical menus and simple procedures. It also accommodetes env of the three types of modems available: a direct connect, an auto dial, or an acoustic coupler.

TLX-A-SYST actuelly turns eny personal computer into a Telex terminal and receiver. Once you heve a modem configured for your PC and plugged into the electrical outlet and the telephone, you're

ready to go.

Plece T.X.-A-SYST program in your A
drive with a word processor. (A minimum-density single disk drive system
may not handle the program, which has 19
files end uses about 120K disk space.)
With your word processor, prepare your
messaess according to the protocol of tele-

TLX-A-SYST
is one of the easiest
software
communications
packages to use.

type communications (which is spelled out in the literature). The protocol specifies that lines must be no longer than 68 characters and must always end with a carriege return. You must avoid a string of

MAIN MENU	
1 - TRANSMIT a Telex Message	
2 - RECEIVE a Telex Message	
3 - PRINT or DISPLAY any Archived Message	
4 - PRINT or DISPLAY Message Traffic Log	
5 - VIEW or MODIFY your Personal Directory	
6 - SET the system as you like it	
E - END	
? - HELP	
ENTER YOUR SELECTION ===>	
Figure 2: Transmit Menu of TLX-A-SYST program.	
TRANSMIT MENU	
1 - File to be sent	===>
2 - Send to Telex number or ASYST code	===>
3 - Send to Answer Back	===>
4 - Number of copies to print	===>
5 - Transmit the Telex	
V - View your personal directory	
M - Main menu	
? - Help	

periods (.....) and semi-colons (;). Each has special significance in Telex transmis-

When your messages are ready to send an cytan file names and an extension, call up A>Telex. You'll be asked for your password. You type it in, but it is not displayed on your screen so that no one can eavasdrop (eyedrop?). Then tha program loss in.

Naxt you establish the date, time, and your identification. TIX-A-SYST utilizas the built-in clock of the IBM PC, so It is not necessary to type in tha time when you log into Telex. You are immediately placed in the main menu from which you elect to transmit or receive massages.

The program consists of a series of short menus. Any questions are quickly explained in the corresponding Halp Manu.

Before you can use any of the menus, you set up the configuration file, which can be updated instantly by the menu. Only six items are required for configuration: the type of modam you're using, the baud reta, local telaphone access number, whether or not you want arthive messages transmitted, and the number of copies for Talex to print. If you change an item, hit U

THE WORDS
"simple," "easy," "as
you can see," "as you
probably know," and
"all you need" are
overused in an effort to
qualify for the userfriendly award of the
year.

for update and it's dona.

The reason for the talaphone number? An auto-dial modem will call the number automatically. With other modems, the number appears on screen, so you don't have to look it up. It's nice to know you can use SPRINT or MCI numbers as wall as numbers that have more than the usual saven digits.

You always work in and out of Main Menu (see Figure 1). It is available by using the letter M from any of the other menus.

Entaring the NUMBER of the desired item will bring up that manu. For example, 1 for TRANSMIT a Talex MESSAGE gats tha Transmit Menu (see Figure 2).

The Receive and Print Menus are similar and need only minimal enswers to start the required action.

start the required action. A convenient feature is the personal directory of Telen numbers, also availables of the convenient of the conve

TLX-A-SYST, like most programs, is simple to use once you know how. But until you get it all together, it is not as obvious as the manual claims. It does, however, concede that you need hands-on experience to understand the menus and how they interact.

Manual Help

The manual contains all the information you need with only a few exceptions. The words simple, cosy, os you con see, os you probably know, and oil you need are overused in an effort to qualify for the uses-friendly award of the year. I tend to be put off by the word simple in any documentation, especially when it appears two or three timas in one paragraph and I am struggling.

The documentation is the usual 8½-by-11-inch typewritten, photocopied printout. The use of subheads, boldface type, and underlining would have relieved the visual boredom of the document and amphasized important information. In an affort to make the "simplicity" of the program a reality, the menual could have been condensed by about one ounter.

The appendix contains installation notes for specific machines including the IBM PC, two pages explaining possible error messages, a clossary, and an index. Pagas are numbered by sections, so actual size is hard to report.

 $T_{\!\scriptscriptstyle HERE\,IS}$

no way to stop a message once it is being sent except by turning off the machine.

Reservations and Suggestions

Only two criticisms of the program were registered by Al Collins, whose judgment I respect. One is that there is no way to stop a message onca it is being sent except by turning off the machine. When would that be necessary? What if you were sending a long message to a foreign country at \$2.90 per minute, and you discovared you ware using the wrong file or tha

wrong Telex number? Second, there is no utility for communicating diractly via the kayboard, which makes immediate dialogue impossible. All messages must first be created on the word processor and than transmitted.

A company spokasperson explained that the purpose of the program is to make it easy for anyona to use Talex without previous experience. Their theory is that it is better to plan your messages in advance and then sand them.

There are other transmission programs

available and often any good modam program will be able to handle Telex messages, but not with the same sophistication as one prepared specifically for tunsmitting. Telex numbers. (There are Telex carrier services in addition to ITT, such as Western Union TWX, and RCA.)

Western Union TWX, and KCA.) If you decide that a Telex number can increase your communication efficiency, so that the television of the control of the cont

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DOS 2.0

Microsoft claims the PC's operating system is now e bridge to Xanix, but it still has more rivers to cross.

IBM FORTRAN

What are some of the problems with the PC's version of this scientific programming languega?

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Coming Up



The Microcomputer Future

Experts look ahead through the end of the 1980s and see the IBM PC continuing to set the pattern for personal computers.

The Art and Science of Programming The September Issue of PC will examine the tools and techniques used by

The September Issue of PC will examine the tools and techniques used b programmers and celebrate the joy and frustration of creating software.

Programming Languages

Over a dozen programming languages are available for the PC. We'll discuss several versions of BASIC, COBOL, UCSD Pascal, APL, C, assembler, and others. This survey will test how fast and how well each language performs different functions.

Birth of a Program

The creators of Volkswriter, 1-2-3, and Snooper Troops tell about the labor pains that preceded the emergence of their popular software.

Linkers

The gap between different operating systems can be bridged by linker software. An experienced programmer tells how it's done.

The 8087 Math Co-processor

IBM has released a chip that enhances the speed and math performance of the PCs 8088 microprocessor. We'll explain what the 8087 is, what it can do, and how you can use it. A tutorial shows how to call on its capabilities from a BASIC program. Also, a resource guide to hardware and software products that are ready to take advantage of the 8087.

The Mythical Man-Month

In 1974 Frederick Brooks wrote a book about the lessons he learned from managing the team that developed the operating system for the IBM/360. His uncommon sense can save programmers and managers from mistakes that still plague today's microcomputer industry.

Peter Norton

The first installment of a column by the creator of The Norton Utilities. He will explain technical aspects of the PC and digress on the philosophy of computing.



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